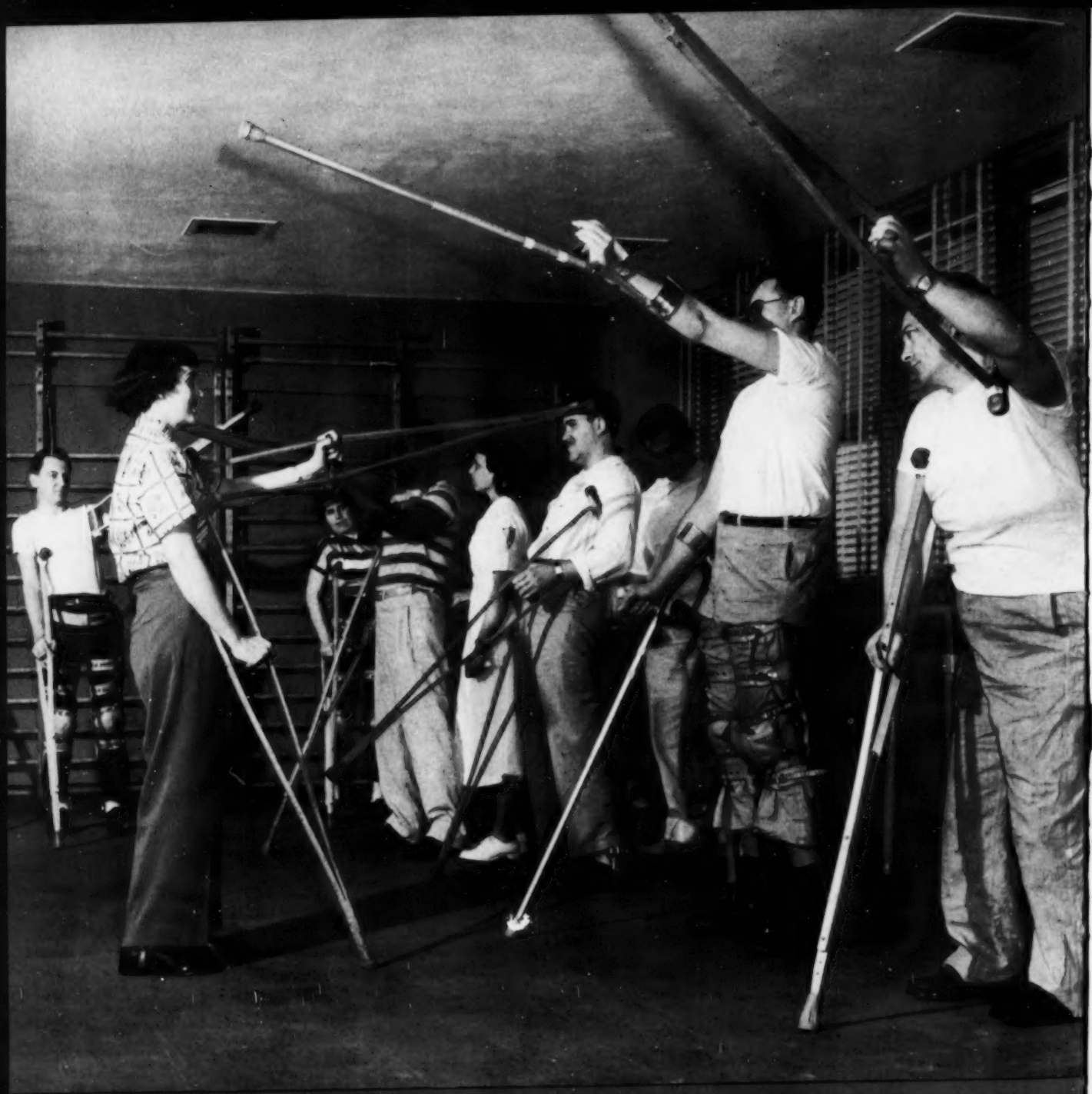
PUBLIC HEALTH REPORTS

In this issue

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service



Rehabilitation

PUBLIC HEALTH REPORTS

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frontispiece

Patients learn how to balance on crutches before learning to walk with them. A former patient instructs the class at the Institute of Physical Medicine and Rehabilitation in New York City.

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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
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Rapid Plasma Reagin Test for Syphilis

JOSEPH PORTNOY, Ph.D., WARFIELD GARSON, M.D., M.P.H., and C. A. SMITH, M.D.

THE RAPID movement or concentration of relatively large numbers of persons into and within the United States has presented certain difficulties in the control of venereal disease. Examples of such movement and concentration of population can be seen among workers in industrial defense plants, migrant farm and marine laborers, immigrants, potential civil defense mass evacuation groups, and similar population concentrations.

Analysis of the problem as it relates to syphilis has suggested that more effective control might be realized by use of a serologic test which would permit rapid and economical screening supplemented by immediate on-the-spot specific and prophylactic treatment of reactors at the times and locations where they are assembled for processing and assignment.

To meet the requirements of a more rapid serologic test for syphilis, a substitute for the conventional serum specimen was needed since considerable time and labor are involved in the processing of blood to serum.

A review of the literature on the use of plasma in serologic tests for syphilis suggested that this type of sample might serve as the needed substitute for serum. Burdon (*1*, *2*) noted that citrated plasma gave more sensitive results in the Kline and Kahn tests than did serum. The greater sensitivity of plasma was attributed to the presence of "more syphilitic reagin" in plasma than in serum. Fresh unheated plasma gave insensitive findings, but exposure at 56° C. water bath for 10 minutes was sufficient to raise the reactivity level to that obtained by heating for 30 minutes. It was necessary to centrifuge the plasma after heating to remove the precipitate which formed during the heating process.

Burdon noted that considerable time was saved by the substitution of plasma for the conventional serum specimen. Barnard and Rein (*3*) found certain objections, such as increased anticomplementary findings and turbidity of specimen, to the use of citrated plasma and utilized the procedure of recalcification with dicalcium phosphate to obtain a serum specimen from the parent citrated plasma. Listed as advantages of this type of specimen were greater resistance to hemolysis of the citrated specimen, ease of separation of the plasma without resort to centrifugation, and greater stability of reagin in stored citrated plasma.

The results on the recalcified plasma specimen had the same validity as those obtained with serum. However, the process of recalcification was rather laborious and time-consuming.

Barnard and Van Hala (*4*) substituted gypsum for dicalcium phosphate for recalcifying citrated plasma. The inactivation of the specimen was accomplished in the presence of the clot and an excess of gypsum. In reports

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Technical assistance in the preparation of this paper was furnished by Jerry L. Smith, medical biologist, Venereal Disease Experimental Laboratory.

The paper was presented in part at the Eighth Annual Symposium on Recent Advances in the Study of Venereal Disease, Washington, D.C., April 24–25, 1957.

of more recent studies of the use of plasma specimens in serologic tests for syphilis, which have included the employment of cardiolipin-lecithin antigens. Rein, Schwartz, and Kelcec (*5*) described a procedure for the conversion of heparinized plasma to serum by use of protamine sulfate. Converted plasma and conventional serum samples gave similar findings. Although the heparinized plasma could also be used in serologic tests, the formation of a precipitate upon heating made such a specimen less desirable for both flocculation and complement fixation tests.

Coleman and Appleman (*6*) reported on the study of plasma specimens obtained with four different anticoagulants. All plasma specimens were heated at 56° C. for 30 minutes and centrifuged to remove precipitated fibrinogen before performing tests. The results indicated that oxalated plasma used in flocculation and complement fixation tests gave reactions similar to those observed with serum; disodium sequestrene plasma yielded reactions similar to those obtained with serum in flocculation tests but gave a very high percentage of anticomplementary tests; treburon plasma produced variable results in flocculation tests and gave anticomplementary results with all specimens; finally, citrated plasma showed slightly more sensitive results in flocculation tests, and essentially similar reactions in complement fixation.

From the foregoing review it was evident that plasma would fit into a procedure for a rapid serologic test for syphilis, provided the plasma could be used directly without heating or subjecting it to time-consuming chemical procedures or cycles of centrifugation. The chief disadvantage to the use of unheated plasma or serum appeared to be the reduced sensitivity of the results obtained (*2, 7*). The possible association of this reduced level of reactivity with the presence of a labile factor, such as complement, suggested the use of a simple and rapid chemical method for inactivating this labile factor.

Unpublished experiments by the senior author using choline chloride indicated it was anticomplementary. The behavior of an antigen suspension containing choline chloride to differentiate the positive reactions occurring in leprosy from those occurring in syphilis (*8*) suggested trial of this antigen suspension with unheated specimens. The results obtained with unheated serums were highly encouraging. It was then found that such an antigen suspension could be used in a test with unheated plasma.

This preliminary report describes the rapid plasma reagin (RPR) test, presents some of the test findings, and discusses some of the potential applications of the procedure.

Collection of Blood Samples

Various anticoagulants were used in obtaining the plasma specimen, including heparin, potassium oxalate, and potassium sequestrene (*4*).

Duplicate samples, to obtain serum, were taken by venereal disease prevention and control centers and venereal disease investigators in all instances. Depending on the availability of particular blood collecting kits, these split samples were obtained by dual collection in B–D Vacutainer tubes, by the piggyback technique (*9, 10*), or by needle and syringe, dividing the sample.

Rapid Test and Treatment Tried

The rapid plasma reagin test for syphilis was used in California this year as part of the program of examining Mexican farm workers entering the United States. At the reception center in El Centro, 47,579 workers were tested from April 16 through June 28. Blood specimens were examined and differential diagnoses completed on the spot. Workers with syphilis were treated and contact information was obtained before they left the center.

Of the 47,579 tests, 3,913, or 8.2 percent, were reactive, and an additional 685 were weakly reactive. Among the reactors diagnosed as syphilitic were 31 primary and secondary cases, 985 early latent cases, and 2,712 latent. The results of the RPR test compared favorably with those of other nontreponemal and treponemal tests done on a sample of about 1,600 specimens.

—WILLIAM J. BROWN, M.D., *chief, Venereal Disease Branch, Communicable Disease Center, Public Health Service, Atlanta, Ga.*

The serums were examined by the VDRL slide technique (*11*) in either the North Carolina State Board of Health Laboratory of Hygiene or a North Carolina county health department laboratory. The plasma specimens were either mailed or brought by messenger to the authors' laboratory.

Test Technique

Preparation of Antigen Suspension. VDRL slide test antigen emulsion (*B*) was prepared (*11*). Measured aliquots of the suspension were then centrifuged in stainless steel tubes in a Servall SS–1 angle centrifuge at room temperature at a relative centrifugal force approximately 2,000×gravity for 15 minutes. The supernatant was decanted and, while the stainless steel centrifuge tube was held in an inverted position, the wall of the tube was wiped with cotton gauze without disturbing the sediment.

A solution containing 10 percent choline chloride solution in 0.85 percent sodium chloride was used in resuspending the sedimented antigen. The volume of the resuspending solution was equal to the volume of the antigen suspension which was centrifuged and was added by blowing it directly onto the sediment.

Agitation of the centrifuge tube by hand was then performed to resuspend the antigen adequately. In early studies antigen suspension was prepared daily. Later it was found that the addition of merthiolate in a final concentration of 0.01 percent maintained the reactivity of the antigen for at least a week when stored at room temperature. The merthiolated antigen suspension was then used in the plasma test over a period of 1 week.

Preparation of Specimens. The blood specimens were centrifuged at room temperature at a force sufficient to separate the plasma from the cellular elements, usually 1,500–2,000 r.p.m. for 4 minutes. The plasma was allowed to remain in the original collecting tube. The specimens were then tested without heating.

Performance of Test. Boerner (*C*) concavity slides were used. Plasma and antigen suspension were measured with disposable capillary pipettes (*D*). For each specimen three drops of plasma were placed on one concavity. One drop of antigen suspension was then added to each plasma specimen. The mixtures were rotated on a mechanical rotator for 4 minutes at 180 r.p.m. The rotator circumscribed a circle three-fourths of an inch in diameter. Tests were read microscopically immediately after rotation, using 100×magnification, and recorded as reactive—large clumps; weakly reactive—medium clumps; nonreactive—small clumps or less.

Results

The results obtained with the RPR test in comparison with the standard VDRL slide test are given in table 1. Regardless of the type of

Table 1. Comparison of results of RPR test and VDRL slide test with a blood specimen

Number cases	Anticoagulant	Results				Percent reactive [1]		Percent agreement [1]
		RPR test	VDRL slide test					
			Reactive	Weakly reactive	Nonreactive	RPR	VDRL	
277	Oxalate	Reactive	11	11	7	15. 2	9. 7	94. 6
		Weakly reactive	0	5	8			
		Nonreactive	0	0	235			
114	Heparin	Reactive	3	1	1	6. 1	3. 5	98. 2
		Weakly reactive	0	1	1			
		Nonreactive	0	0	107			
1, 218	Potassium sequestrene	Reactive	25	43	14	9. 1	6. 3	97. 2
		Weakly reactive	0	9	20			
		Nonreactive	0	0	1, 107			

[1] Reactive plus weakly reactive.

Table 2. Clinical histories on cases with disagreement between RPR and VDRL slide tests

Anticoagulant	Serologic pattern	Number cases	Number with history of syphilis
Oxalate	RPR reactive, VDRL nonreactive	7	[1] 6
	RPR weakly reactive, VDRL nonreactive	8	6
Heparin	RPR reactive, VDRL nonreactive	1	1
	RPR weakly reactive, VDRL nonreactive	1	0
Potassium sequestrene	RPR reactive, VDRL nonreactive	14	14
	RPR weakly reactive, VDRL nonreactive	20	[2] 18
Total		51	45

[1] 1 case could not be located.
[2] 1 case received numerous treatments for gonorrhea.

anticoagulant used, the RPR test was consistently more reactive than the VDRL test on serum. Highly significant differences between the two tests were noted for the 1,609 cases tested without regard to the type of anticoagulant used. In no instance was a reactive or weakly reactive result obtained in the VDRL test in the face of a nonreactive RPR test.

The differences in the percentage of combined reactive and weakly reactive findings obtained with the three anticoagulants should not be attributed to the anticoagulant used inasmuch as the samples collected were from different areas in North Carolina. However, the ratio of reactive RPR to reactive VDRL tests in the groups representing the three anticoagulants was fairly constant at about 1.5:1.

Clinical documentation on those cases giving discordant findings between RPR and VDRL tests is presented table 2). In 51 cases of disagreement, 45 or 88 percent gave a history of treated syphilis; 1 case could not be located.

Discussion

Several factors can be considered to account for the greater sensitivity of the RPR test as compared with the VDRL slide test with serum. An obvious factor is the reactivity level of the VDRL slide test, which is set at a lower level than some of the other serologic tests for syphilis. Somewhat greater agreement in sensitivity would be expected if the more sensitive procedures were compared with the RPR test. However, these data are lacking at present.

Another factor is the enhancing effect of choline chloride on the reactivity level of the antigen. This effect has been shown to occur in tests with heated serums (*8*). In 112 syphilitic serums, all TPI reactive, 87.5 percent reactive results were obtained with the VDRL slide test, whereas 97.3 percent reactive results were obtained with antigen containing choline chloride. Still another factor may be the greater reagin content of unheated plasma as compared with the reagin content of heated serum. Barnard and Rein (*3*) have referred to the greater stability of reagin in stored citrated plasma than in the conventional serum sample obtained from whole clotted blood. The destruction of reagin due to heating of serum has been reported and review by Rein and Hazay (*7*).

The results thus far obtained do not indicate any lower degree of specificity of the RPR test as compared with the VDRL slide test. As

was shown in table 2, nearly all of the cases wherein discrepancies between the RPR test and VDRL slide test were encountered represented treated cases of syphilis. In view of the prior notation of the greater specificity of the antigen suspension containing choline chloride when used in conjunction with heated leprosy serums of nonsyphilitic origin, these preliminary findings on unheated plasma are perhaps not unexpected.

In considering the potential applications of the RPR test, the cost of the test is of interest. It has been estimated that the cost of the RPR antigen per test dose is a fraction of 1 cent more than the cost of the conventional VDRL antigen test dose. However, if early experiences with stored antigen suspensions are substantiated, the cost of the RPR test might conceivably be lower than the cost of the VDRL test since it would be possible to utilize antigen suspensions more completely.

The most significant economies with the RPR test will probably be associated with time and personnel. The time and labor involved in bringing the serum specimen to the testing stage is considerable. These are markedly reduced by use of plasma directly from the blood collection tube. The individual specimen is ready for testing immediately after centrifugation.

Exclusive of the glassware employed in the preparation of the antigen suspension and the concavity slides, all other items are disposable, thereby eliminating washing and glass breakage. The present cost of the disposable pipette is a fraction more than 2 cents. This cost may be lowered with greater demand and perhaps with the development of a cheaper substitute. It is hoped, too, that a disposable plastic slide will be developed.

The RPR test might be of value in mass blood testing programs since it would require fewer man-hours to handle a given load than conventional serologic methods. The rapidity of the RPR test would make it valuable in screening large numbers of migrant laborers, immigrants, and industrial groups—operations in which speed is or may be most desirable, if not critical.

Another potential application of the RPR test is its use by venereal disease investigators or other authorized personnel in conducting on-the-spot serologic testing. Present practice involves the collection and shipment of blood specimens to a distant laboratory. Upon receiving notice of the serologic findings the investigator must locate the individuals for further study and treatment. It is not always possible to find these patients. In a recent survey for syphilis among migrant farm laborers, 10 percent of nonwhite persons found to have positive serologic tests could not be located for treatment (*12*). By operating out of a base laboratory, which would supply prepared antigen suspension and other materials, and with a modicum of training, it would be possible for field personnel to collect and test blood at the source and take immediate action in those individuals giving reactive results.

Finally, the RPR test might also prove to be valuable (*a*) as an adjunct in planning for syphilis control among civil defense and major disaster evacuee groups, (*b*) in processing sudden mass immigration groups, (*c*) in hospital and clinical laboratories, and (*d*) in public health programs of a multiphasic nature, particularly in those situations where hematological or other studies require blood collected in anticoagulant.

Summary

A review of the literature on the use of blood plasma in serologic tests for syphilis suggested that plasma would fit into a procedure for a rapid serologic test, provided that the plasma could be used without heating or time-consuming chemical procedures or cycles of centrifugation.

Plasma and serum specimens from 1,609 syphilitic patients were tested. Sedimented VDRL slide test antigen emulsion was resuspended in 10 percent choline chloride and used in the plasma test. Blood specimens were centrifuged at room temperature, and the plasma was tested without heating. Mixtures of plasma and antigen were rotated on a mechanical rotator for 4 minutes at 180 r.p.m., and tests were read microscopically immediately after rotation.

The rapid plasma reagin (RPR) test on plasma was consistently more reactive than the VDRL slide test on serum, regardless of the

anticoagulant used. In no instance was a reactive or weakly reactive result obtained in the VDRL test when the RPR test was nonreactive. In 51 of the 1,609 cases, the RPR test was reactive to some degree when the VDRL test was nonreactive. Of these 51 patients, 45 (88 percent) gave a history of treated syphilis; 1 patient could not be located.

The RPR test for syphilis may prove to be valuable for several reasons. It is more economical than the VDRL slide test. It requires fewer man-hours to examine a given number of specimens. It could be used for on-the-spot serologic testing by venereal disease investigators instead of sending blood specimens to distant laboratories. It might also prove to be valuable in planning syphilis control among civil defense and major disaster evacuee groups, in processing sudden mass immigration groups, in hospital and clinical laboratories, and in multiphasic public health programs.

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(A) The anticoagulant containing tubes were supplied by Tom Starling of the Becton, Dickinson & Co., Rutherford, N. J.

(B) VDRL slide test antigen was supplied by Sol Rosenberg, Sylvania Chemical Co., Orange, N. J.

(C) No. 66550 Micro Slide, Boerner. American Hospital Supply Co. Scientific Products Division, Evanston, Ill.

(D) No. 67770 diSPO-pette. American Hospital Supply Co. Scientific Products Division, Evanston, Ill.

Symposiums on Industrial Health Problems

The effects of habituating drugs on industrial workers will be discussed in the morning of a full-day session on industrial health problems on November 14, 1957, during the annual meeting of the American Public Health Association in Cleveland, Ohio. For the afternoon meeting, the scheduled topic is the status of the pneumoconioses. The session will be co-sponsored by the occupational health section of the American Public Health Association, the Industrial Medical Association, and the American Industrial Hygiene Association.

Influenza Epidemic Alert

Surgeon General LEROY E. BURNEY

For the first time in history, public health workers in this country are in the position of being ahead of an impending major epidemic, caused by a new variant of A-type influenza virus.

The cooperation of many groups has both forewarned us and given us the means to curtail the extent of the epidemic. We must take steps immediately if we are to make effective use of the means at hand.

Inoculation with a vaccine containing the newly discovered Asian strain influenza virus is the only preventive we have available. Six major pharmaceutical companies have been licensed by the Public Health Service to manufacture influenza vaccine, and all six companies report that they are working at an accelerated production schedule to produce at least 60 million cubic centimeters by February 1, 1958, enough vaccine to provide protection for one-third of the population.

Our job as public health workers is to encourage the use of every bit of the vaccine just as soon as it becomes available. It is expected that plans for purchase and distribution of vaccine will be worked out jointly in local communities by health departments, private physicians, hospitals, and other interested groups. Meanwhile, plans for meeting an epidemic situation nationally have been worked out cooperatively by the Public Health Service, the Association of State and Territorial Health Officers, the American Medical Association, the American Hospital Association, the American Public Health Association, and various professional groups and voluntary health agencies.

National, State, and local joint planning is necessary not only to insure the widest possible use of available vaccine, but also to prepare for the probability that influenza in epidemic proportions will affect those who are unable to obtain vaccine or who do not avail themselves of it. It is conceivable that 20 percent of the population of an area may be stricken with influenza. This could cause serious disruption in industry, government, education, and essential services. Such circumstances would, of course, severely strain medical personnel and care facilities.

Thus public health, together with other professions in the health and allied fields, faces a unique challenge. The traditional tasks of surveillance, reporting, laboratory services, and the like must go on at an accelerated pace. At the same time, a tremendous job must be done in public information and education with respect to use of the vaccine. Finally, public health agencies have to plan and prepare for the emergency services that will be needed if and when an epidemic strikes.

Asian Strain of Influenza A

An influenza outbreak first noted in late April 1957 in Hong Kong, chiefly among recent refugees from China, was followed rapidly by others in Singapore, Taiwan, the Philippines, and the Malay States. On request from Walter Reed Army Institute of Research, United States military laboratories near these areas, notably the 406th Medical General Laboratory, U. S. Army, at Zama, Japan, promptly undertook study of the epidemiology of this disease, which appeared to be highly communicable but not ordinarily fatal.

The infection attacked on the average an estimated 18 to 20 percent of the population in affected areas. Incidence in certain localities was reported as high as 60 percent. Characterized by rapid onset, fever, malaise, muscular aches and pains, and coryza, the disease lasts 3 to 5 days. Mortality, occurring mostly in infants and debilitated persons, has been less than 1 per 1,000 cases.

On April 25, Army medical teams in Japan took throat washings from affected crew-members of a United States aircraft carrier recently out of Hong Kong, and, on noting that isolated virus strains appeared unusual, sent the isolates to the United States for antigenic analysis. These strains together with others recovered from the epidemics at Hong Kong and Singapore were analyzed at the Walter Reed Army Institute of Research in Washington, D. C. On May 22, the Walter Reed laboratory announced the virus to be type A influenza, but strikingly different antigenically from previously known strains of this type, and reported the findings to the World Health Organization, the Public Health Service, and the Armed Forces Epidemiological Board. Similar findings were reported shortly thereafter from the World Influenza Center in London and from Sir Frank Macfarlane Burnet's laboratory in Australia.

Tests of 30 serum specimens collected at random from personnel at Walter Reed Army Medical Center showed no detectable antibody against the virus, further evidence of a new strain of influenza virus.

Precautionary Measures

On the basis of these findings, the World Health Organization alerted all influenza centers and distributed new strains for further intensive studies. Using prototype strains received from the Walter Reed Army Institute of Research, the WHO International Influenza Center for the Americas in the Communicable Disease Center in Montgomery, Ala., sent ampules of the strain A/Japan/305/57, samples of related strains, and hyperimmune serums to laboratories in the Western Hemisphere collaborating in the influenza study program. Studies are now under way at this center, as well as at the University of Michigan School of Public Health and the Walter Reed Army Institute of Research, on antibody reactions with various regimens for vaccination.

A number of strains of Asian influenza virus were sent in dried form by the Walter Reed institute to the Division of Biologics Standards, National Institutes of Health, Public Health Service, for distribution to the six licensed manufacturers of vaccine. All six houses promptly began to produce experimental monovalent vaccine. Four contracted for fall delivery of vaccine to the Department of Defense. Supplies for the public were expected by the industry to reach at least 60 million cubic centimeters by February 1, 1958.

Epidemic Reporting

The WHO International Influenza Center for the Americas and the World Influenza Information Center in London act as clearinghouses for news of influenza outbreaks anywhere in the world.

In the United States, health agencies are receiving current information on confirmed or suspected outbreaks of Asian influenza in the *Morbidity and Mortality Weekly Report* issued by the National Office of Vital Statistics, Public Health Service.

The Public Health Service instructed its epidemic intelligence officers, assigned to local and State health departments, to assist health officers in investigating early signs of the occurrence of influenza. In addition, quarantine officers of the Service advised travelers from affected areas to see a physician if respiratory illness develops within 10 days after arrival in

Calendar of Major Events in the 1957 Outbreaks

April 18. Newspaper report of influenza outbreak in Hong Kong. Cable instructions from Walter Reed Army Institute of Research in Washington, D.C., to 406th Medical General Laboratory, U.S. Army, in Japan to investigate. Similar outbreak in Singapore.

April 25. U.S. aircraft carrier out of Hong Kong docked at Yokosuka, Japan. Influenza aboard. Throat washings from affected crew members taken by U.S. Army medical personnel and first isolation made at 406th Medical General Laboratory.

May 22. After analysis of 2 strains recovered in Japan, 1 strain from the Hong Kong outbreak, and 2 strains from Singapore, Walter Reed Army Institute of Research announced they were antigenically different from other type A influenza viruses. No detectable antibodies against new viruses found in personnel selected at random. New strains supplied to WHO International Influenza Center for the Americas and National Institutes of Health for distribution to six manufacturers of vaccine.

May 23. Division of Foreign Quarantine, Public Health Service, instituted measures to identify and follow up travelers from the Orient with respiratory disease.

June 2. Influenza on board vessels at Newport, R. I. Strains of virus from throat washings identified as Asian type. Throat washings taken at Norfolk, Va., on a vessel from Newport. Asian influenza virus identified. Cases on these vessels totaled 373; attack rates ranged from 3 to 45 percent.

June 7. The first experimental vaccine was submitted to the Division of Biologics Standards, Public Health Service, for testing.

June 10. The Surgeon General of the Public Health Service met with advisory committee of physicians and health officers.

June 11. On a naval vessel entering San Diego after a training cruise, 78 of 130 crew members were ill with a respiratory disease later identified as type A influenza by virus isolation. Within 2 weeks, more than 70 percent of the crew were attacked, and 2,770 recruits were affected. Etiological agent confirmed as Asian strain virus.

June 12. The Surgeon General of the Public Health Service met with technical representatives of the licensed manufacturers of vaccine.

June 16. During the following week, 137 persons from Mare Island Naval Base, Calif., were hospitalized with respiratory disease.

June 17–30. At Fort Ord, Calif., 245 cases were confirmed as Asian strain influenza by virus isolation and serologic tests.

June 20. Two outbreaks of influenza reported in California civilians.

June 25. Representatives of the American Medical Association met with the Surgeon General of the Public Health Service on medical manpower utilization in event of an epidemic.

June 26. At least 200 cases of influenza, Asian strain, occurred among 1,800 persons from 43 States and several countries attending a conference at Grinnell, Iowa. Of the first 12 cases, 11 were from California. After the conference, about 48 of those who had attended were reported ill.

July 10–24. Influenza among Boy Scouts at Jamboree in Valley Forge, Pa. First occurrence among California contingent of 1,000.

July 19. Reports from the Netherlands that certain serums from aged persons contain inhibitory substance for hemagglutination of Asian influenza virus confirmed at WRAIR.

July 24. Evidence of antibodies against Asian virus among certain elderly persons in Massachusetts indicated by tests at the Virus and Rickettsia Section of the Communicable Disease Center in Alabama. Significance of demonstration of inhibiting substance against Asian influenza in serums of aged persons remains undetermined.

Diagnosis of Asian virus in Boy Scouts confirmed at WRAIR, later at NIH.

July 31. Project at Veterans Administration Hospital, Livermore, Calif., on the use of irradiation with ultraviolet light in preventing spread of Asian influenza.

August 12. The Public Health Service released 502,000 doses of vaccine for the armed forces and civilians, civilian lots to be distributed through hospitals, clinics, and private physicians. The Service recommended that State and local governments give priority to vaccination of persons engaged in essential work.

the United States. Names and addresses of those ill with such a disease on arrival are forwarded to health officers in their home communities.

On June 10, the Surgeon General called the first meeting of the 10-member Advisory Committee on Influenza, formed of private physicians and public health officers. Committee members stressed the value of prompt reporting of suspicious cases, so that any occurrence of suspected influenza can be subjected to laboratory analysis through the State and local health department.

A statement by a number of medical organizations collaborating with the Public Health Service outlined specific procedure for physicians based on specifications of the WHO Influenza Typing Center for the Americas at the Public Health Service influenza laboratory in Montgomery, Ala.

"Optimally, the washings should be obtained during the first 3 days of illness and while the patient is still febrile, although virus may be recovered as long as 7 days after onset. The patient should gargle 3 times, using about 15 ml. of diluent (broth, skimmed milk, or distilled water) and returning the washing each time to the paper cup. Some infective material may be brought from the trachea into the pharynx if the patient will cough. The washings should be transferred to a closed tube for transportation to the laboratory and tested as soon as possible. If a delay of more than a few hours is necessary, the fluid should be kept chilled at refrigerator temperatures. When longer periods of storage are unavoidable, the washing should be frozen and stored, preferably near 70° C. Serum samples should also be taken, one during the time of illness and a second, 2 to 4 weeks later.

"Not all laboratories are prepared to do virus isolation and serology for influenza. State health departments, however, can either do these procedures or refer the specimens to influenza reference laboratories such as the one at the Public Health Service's Communicable Disease Center Virus and Rickettsia Laboratory, Montgomery, Ala."

Dental Care for the Aged and Chronically Ill

A 4-year study to explore ways of providing dental care to the aged and chronically ill was launched by the Public Health Service in July 1957. The survey covers the Kansas City metropolitan area. During the first 6 months, investigators will study the dental needs of a sample of about 1,500 chronically ill patients in nursing homes and an undetermined number confined to the home.

The second phase of the study will concentrate on the administrative and organizational approach to the problem, supplementing technical research in this field. Collected data on costs and methods will be useful to communities planning programs for the chronically ill and aged who do not now receive dental care.

The University of Kansas City School of Dentistry has donated space for the study clinic; and Community Services, Inc., a nonprofit research agency in Kansas City, is assisting the Division of Dental Public Health, Public Health Service, in the project. Other voluntary and official agencies in the area will be called on to participate as the study progresses.

Influenza Epidemics During 1951–56 With a Review of Trends

SELWYN D. COLLINS, Ph.D., and JOSEPHINE L. LEHMANN

DEATHS from influenza and pneumonia in the United States have decreased steadily since 1900 except during the great pandemic of 1918–19. The greatest decrease began about 1937, with the advent of the sulfa drugs and, a few years later, of penicillin and aureomycin. Deaths from influenza and pneumonia, however, still rank among the first 10 causes of death in the United States and were sixth in 1955 (*1*).

Because influenza and pneumonia are of such major importance as a cause of death and because of the explosive nature of influenza, these diseases continue to be of great concern. The Influenza Information Center at the National Office of Vital Statistics, part of the World Health Organization Influenza Study Program in the United States, receives reports on local outbreaks of influenza and on the predominating strain of the virus involved in these outbreaks (*2*).

The weekly reports of mortality from influenza and pneumonia received by the National Office of Vital Statistics from the health departments of 62 large cities are the basis of this review. Since pneumonia is so often the termination of fatal cases of influenza, mortality from influenza can hardly be separated from mortality from pneumonia. This study reviews excess mortality from influenza and pneumonia from the summer of 1950 through the summer of 1956. Previous papers have reviewed excess mortality during epidemics of these diseases from 1918 to 1951 (*3–8*).

Dr. Collins is chief of the Morbidity and Health Statistics Branch, Division of Public Health Methods, Public Health Service, and Mrs. Lehmann is an assistant statistician in that branch. The National Office of Vital Statistics cooperated with the Division of Public Health Methods in this study, which includes a review of trends and epidemics of influenza and pneumonia in the years preceding 1951.

Mortality Trend, 1900–56

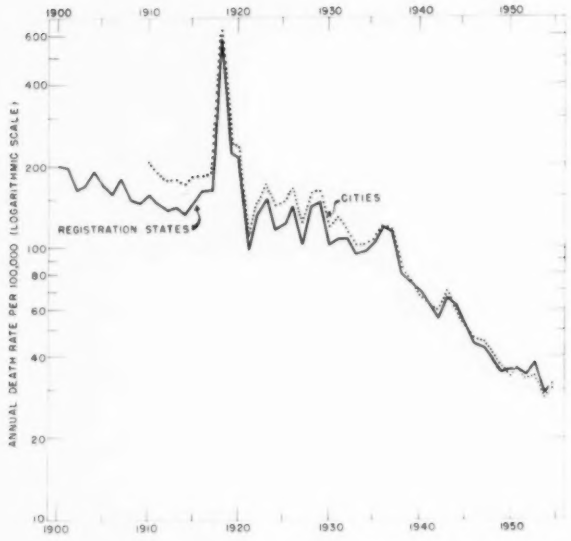
The trend of influenza and pneumonia mortality for the registration States from 1900 and for groups of cities from 1910 is shown in figure 1.

For the purpose of showing the trend line on a comparable basis for the whole series of years, mortality rates from 1949 through 1955 were corrected by the ratio of the fifth to the sixth revision of the International Lists (*9*). Since the trend is plotted on a logarithmic scale which shows the percentage rather than the actual change in the rates, the curve would remain the same except for a difference in its level.

The general downward trend in influenza and pneumonia mortality becomes more abrupt in 1937. This decline continues through 1954 but provisional data for 1955, based on the NOVS 10 percent sample, shows a small increase in influenza and pneumonia deaths.

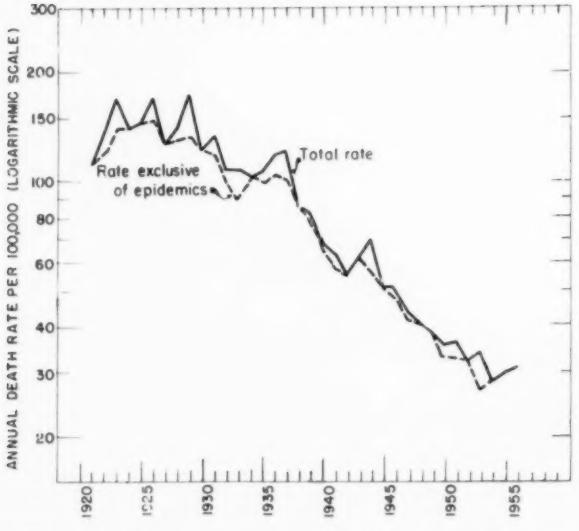
The trend line for the cities parallels very closely the trend line for the registration States. The 62 cities in this study had a combined population in 1950 of 36,000,000. With the exception of four cities in the Mountain States, each city had a population of over 100,000. The

Figure 1. Trend of mortality from influenza and pneumonia in the registration States, 1900–55, and in groups of cities in the United States, 1910–55.



NOTE: Rates are for calendar years: 35 cities, 1910–19; 90 cities, 1920–42; 56 cities, 1943–50; 62 cities, 1951–55. Registration States rates for 1949–55 are plotted on the basis of the fifth revision of the International Lists (9).

Figure 2. Trend of mortality from influenza and pneumonia in groups of cities in the United States, including and excluding epidemic excess deaths, 1920–56.



NOTE: Rates are for years ending in mid-August, that is, 32d week of the calendar year. For data prior to 1943 see tables 1 and 3 of reference 8.

weekly death reports from the group of cities show about the same increase in mortality from influenza and pneumonia in 1955 as the 10 percent NOVS sample for the United States.

The trend of annual death rates from influenza and pneumonia for these same cities for the years ending in mid-August 1920–56 is shown in figure 2. The solid line shows the total rates and the dotted line shows the rates exclusive of excess deaths during influenza epidemics. For the winter of 1953–54, mortality rates are the lowest of any year for which influenza and pneumonia deaths have been recorded since the establishment of the registration area. Mortality rates for the years 1954–55 and 1955–56 seem to have followed a small upward course (table 1).

Table 1. Annual mortality from influenza and pneumonia in cities of the United States [1]

Year ending in mid-August (32d week)	Annual death rate per 100,000	
	Including epidemic excess deaths	Excluding epidemic excess deaths
1943 [2]	62. 2	62. 2
1944	70. 4	56. 0
1945	51. 4	51. 4
1946	51. 2	47. 5
1947	44. 4	41. 9
1948	41. 4	41. 4
1949	38. 9	38. 9
1950	35. 6	32. 9
1951	35. 8	32. 9
1952	32. 8	32. 8
1953	34. 2	27. 3
1954	28. 8	28. 8
1955	30. 2	30. 2
1956	31. 3	31. 3

[1] 56 cities, 1943–50; 62 cities, 1951–56.
[2] For years prior to 1943, see tables 1 and 3 of reference 8.

The trend of annual mortality rates for influenza and pneumonia by geographic area from mid-August 1935 to mid-August 1956 is shown in figure 3. As figure 1 shows for the combined group of cities, these are the years of the most dramatic decline in these rates. The 1943 epidemic is evident in all geographic sections. The mortality rates in 1950–51 and again in 1952–53 show the highest peaks for the Mountain area. Except in New England

and on the Pacific coast, the 1953 rise in the mortality rates for influenza and pneumonia (shown in figures 1 and 2 for the United States and for the groups of cities respectively) is evident in each geographic section. In the winter of 1955–56, these rates increased in all geographic sections except the Middle Atlantic (table 2).

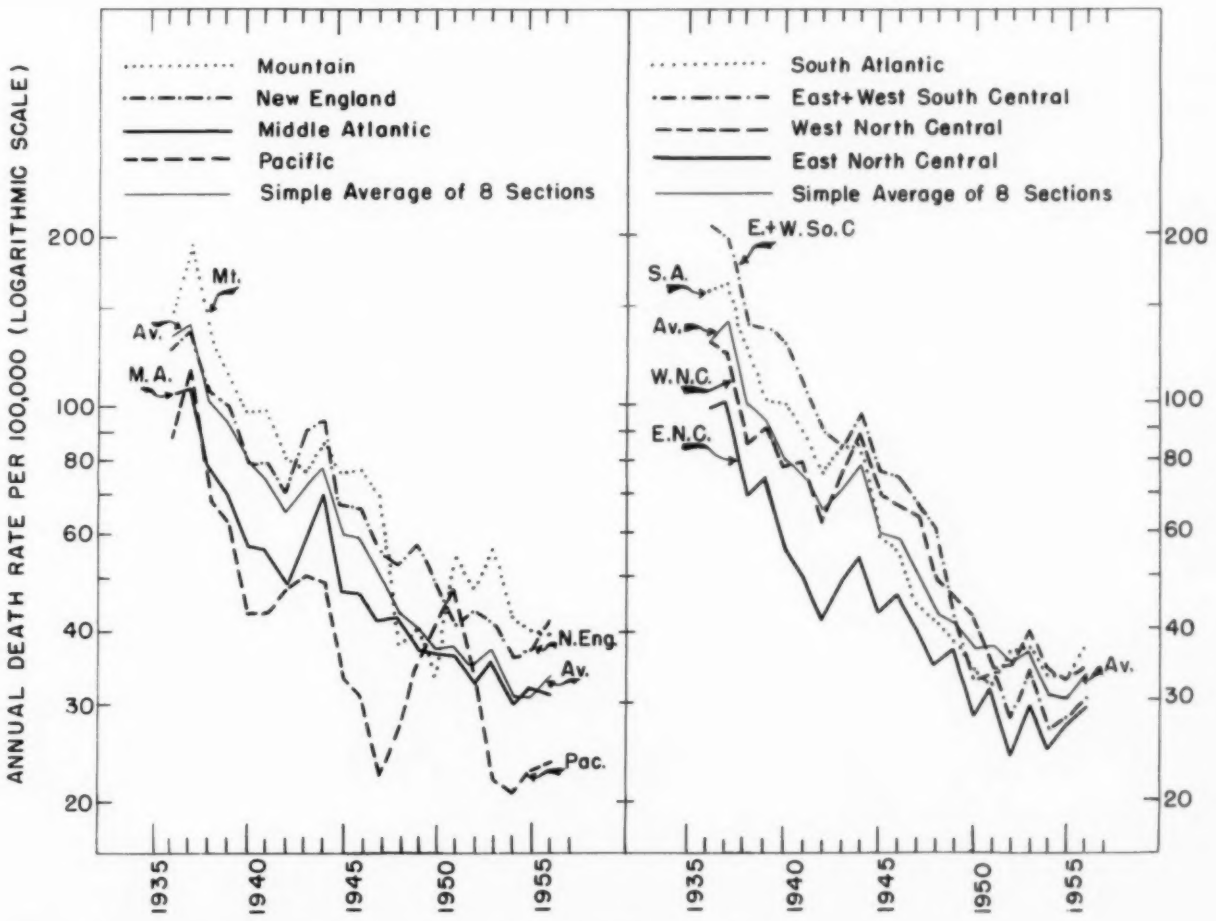
Excess Mortality

Weekly excess mortality has been used as the measure of size of outbreaks of influenza in previous studies of this series. The method of computing the normal seasonal curve has been described in detail in a preceding paper (*3*). For the years 1950–56 a seasonal expectancy for deaths from influenza and pneumonia was based on a 5-year moving average of rates for the group of 62 cities for corresponding weeks of the 5 years ending in August 1955.

The seasonal expectancy was computed as follows: The moving averages of the 5-year means of rates were plotted on a large-scale chart and definite epidemic items were replaced by values interpolated by inspection. Adjustment for change in level of the actual rates was made at quarterly intervals by relating the average of these actual nonepidemic rates for each quarter of each year to the corresponding quarter of the normal seasonal curve to obtain a ratio of the actual to the expected rate.

Between these quarterly ratios (centering in the middle of each quarter) interviewing weeks were obtained by a straight line interpolation.

Figure 3. Trend of mortality from influenza and pneumonia in cities in each of eight geographic sections of the United States, 1935–56.



NOTE: For data prior to 1943, see table 3 of reference 8.

The ratio for a given week of each year was applied to the rate for the corresponding week in the normal seasonal curve to obtain a seasonal expectancy for each week of each year. This quarterly adjustment, while rough, gives a fairly good approximation to the normal seasonal expectancy of influenza in each of the years in this study and a basis from which to derive the weekly deviations around this normal expectancy. This same process was repeated for each of the geographic sections.

These data are shown in figure 4 for the group of 62 cities in the study. Since 1950 there have been two epidemics of influenza, a small one early in 1951 and a larger one in 1952–53. The 1952–53 outbreak is the largest since the epidemic of 1943–44 but only about half the size of that outbreak in terms of total

Table 2. Annual total mortality per 100,000 from influenza and pneumonia in 62 cities of eight geographic sections of the United States, 1951–56

Year ending in mid-August (32d week)	All cities	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East and West South Central	Mountain	Pacific
1951 [1]	35. 8	40. 9	35. 3	31. 1	34. 7	32. 4	34. 3	54. 0	45. 8
1952	32. 8	43. 8	32. 6	24. 4	34. 8	36. 5	27. 8	47. 5	33. 6
1953	34. 2	42. 2	35. 4	30. 4	40. 1	37. 3	33. 8	55. 5	22. 4
1954	28. 8	36. 3	30. 3	24. 7	34. 4	33. 5	26. 8	41. 5	21. 0
1955	30. 2	37. 5	32. 0	27. 4	33. 0	32. 7	27. 7	40. 1	22. 9
1956	31. 3	41. 9	31. 2	29. 1	34. 5	37. 4	30. 2	40. 7	23. 9

[1] For years prior to 1951, see table 4 of reference 3.

Table 3. Summary of period covered by epidemics and of the excess [1] mortality from influenza and pneumonia in epidemics in groups of cities [2] in the United States, 1951–56

Date of epidemic and geographic section	Total excess mortality during whole epidemic per 100,000 population	Date of middle (Wednesday) of peak week	Actual excess per 100,000 for peak week	Total number of weeks included	Approximate dates of epidemic	
					Beginning	End
Early 1951 [3]						
All cities	3. 8	Mar. 14	0. 64	10	Feb. 11	Apr. 21
New England	6. 5	Feb. 28	2. 09	8	Feb. 11	Apr. 7
Middle Atlantic	5. 0	Feb. 28	1. 15	9	Feb. 11	Apr. 14
East North Central	3. 1	Mar. 21	. 65	11	Mar. 4	May 19
South Atlantic	4. 8	Apr. 11	. 58	16	Dec. 31	Apr. 21
East and West South Central	5. 3	Feb. 14	. 87	11	Feb. 4	Apr. 21
Mountain	5. 0	Oct. 25	1. 56	8	Oct. 8	Dec. 2
Pacific	6. 0	Mar. 14	1. 05	12	Feb. 11	May 5
Early 1953						
All cities	6. 9	Feb. 11	. 94	13	Dec. 28	Mar. 28
New England	4. 5	Feb. 18	. 76	11	Jan. 4	Mar. 21
Middle Atlantic	3. 9	Feb. 11	. 70	13	Dec. 28	Mar. 28
East North Central	3. 4	Feb. 11	. 65	11	Dec. 28	Mar. 14
West North Central	10. 9	Jan. 28	2. 48	12	Dec. 28	Mar. 21
South Atlantic	6. 8	Feb. 25	1. 38	11	Dec. 28	Mar. 14
East and West South Central	9. 8	Jan. 28	1. 99	13	Dec. 28	Mar. 28
Mountain	13. 0	Jan. 28	2. 52	14	Dec. 14	Mar. 21
Pacific	3. 5	Mar. 11	. 56	15	Dec. 28	Apr. 11

[1] For methods of computation see appendix to reference 3.

[2] For names of cities see appendix tables in reference 3. The 6 cities added to the Mountain section were Albuquerque, Colorado Springs, Ogden, Phoenix, Pueblo, and Tucson.

[3] For years prior to 1951 see table 5 of reference 3.

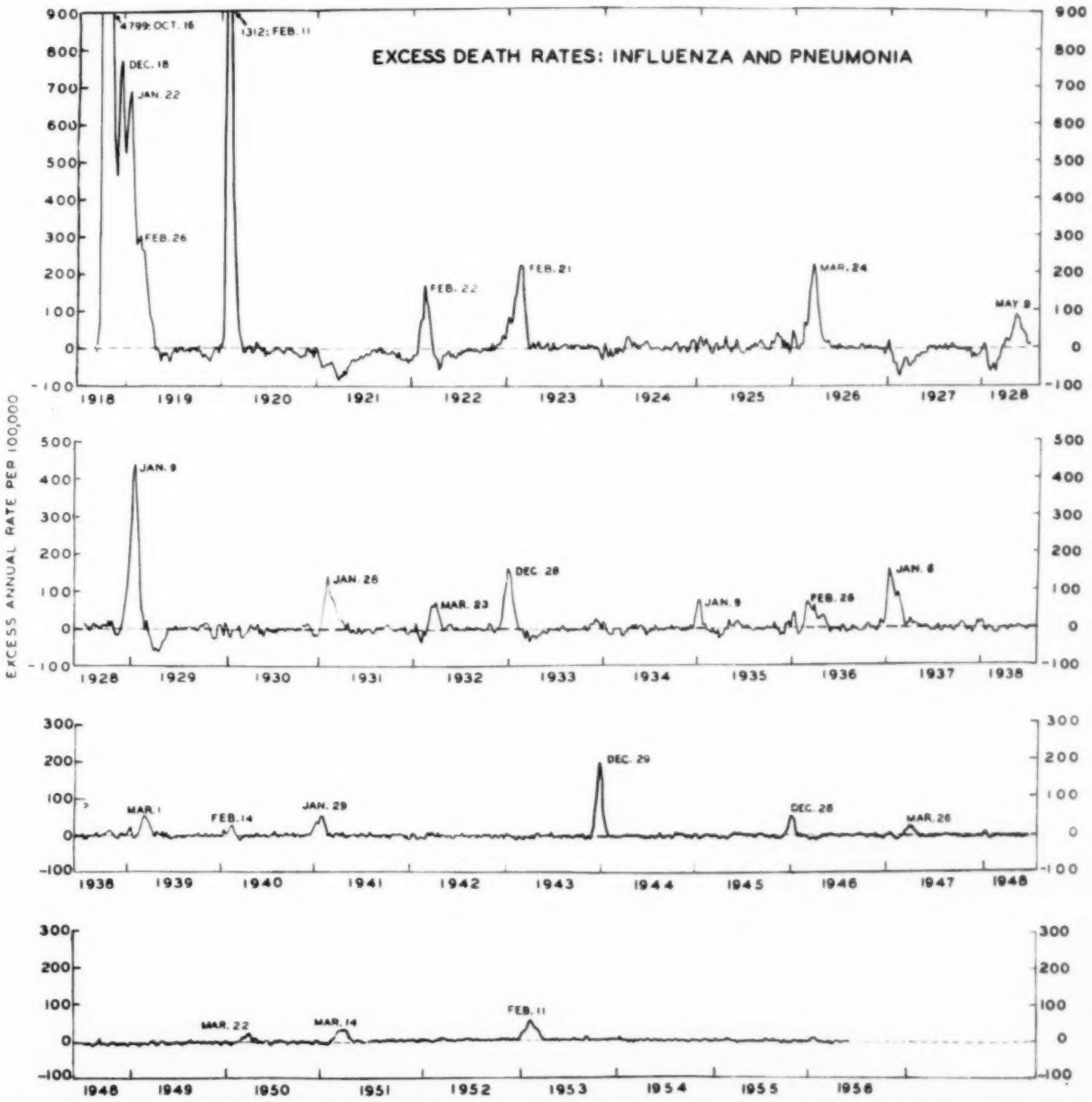
NOTE: Geographic sections omitted from the table had no excess mortality from influenza and pneumonia during the particular epidemic.

excess mortality. The total excess mortality for the whole of an epidemic is obtained by reducing the sum of the rates for the weeks involved from an annual to an actual basis.

The high mortality rates for all causes of death for the United States in January and February of 1953 reflect the high mortality from influenza and pneumonia (*2*).

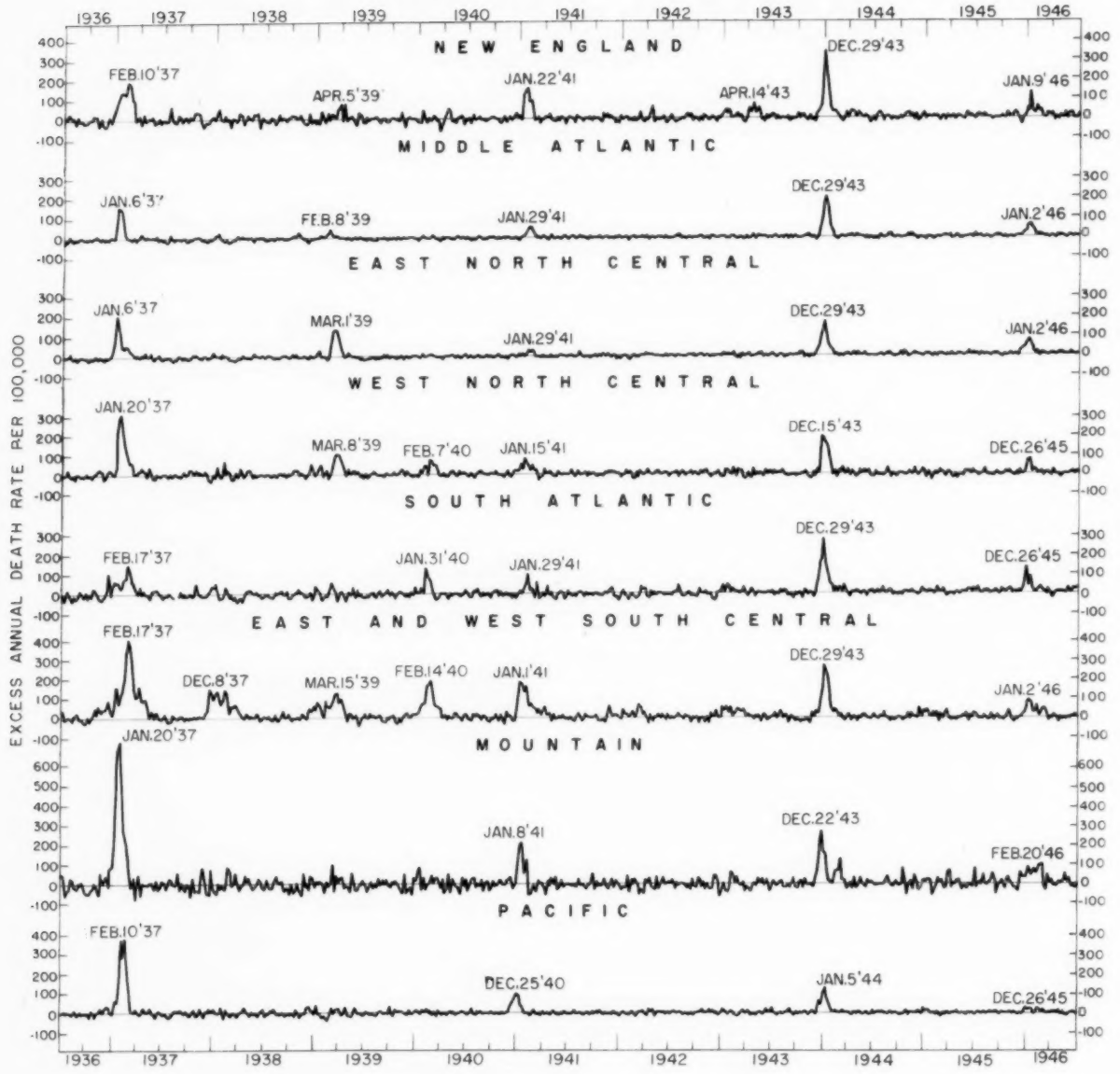
Table 3 gives a summary of the total excess mortality from these causes during epidemics in 1951–56, the date of the middle of the peak week, and the approximate length of each epi-

Figure 4. Weekly excess mortality (annual basis) from influenza and pneumonia in groups of cities in the United States, September 1918 to August 1956.



NOTE: Dates on charts are middle (Wednesday) of peak weeks. In 1920–29, excess rates are deviations from the smoothed median rate for corresponding weeks for the period 1921–27; in 1930 and later years, they are deviations from average rates for corresponding weeks of years exclusive of or without serious epidemics, with adjustment for downward trend in non-epidemic rates.

Figure 5. Weekly excess mortality (annual basis) from influenza and



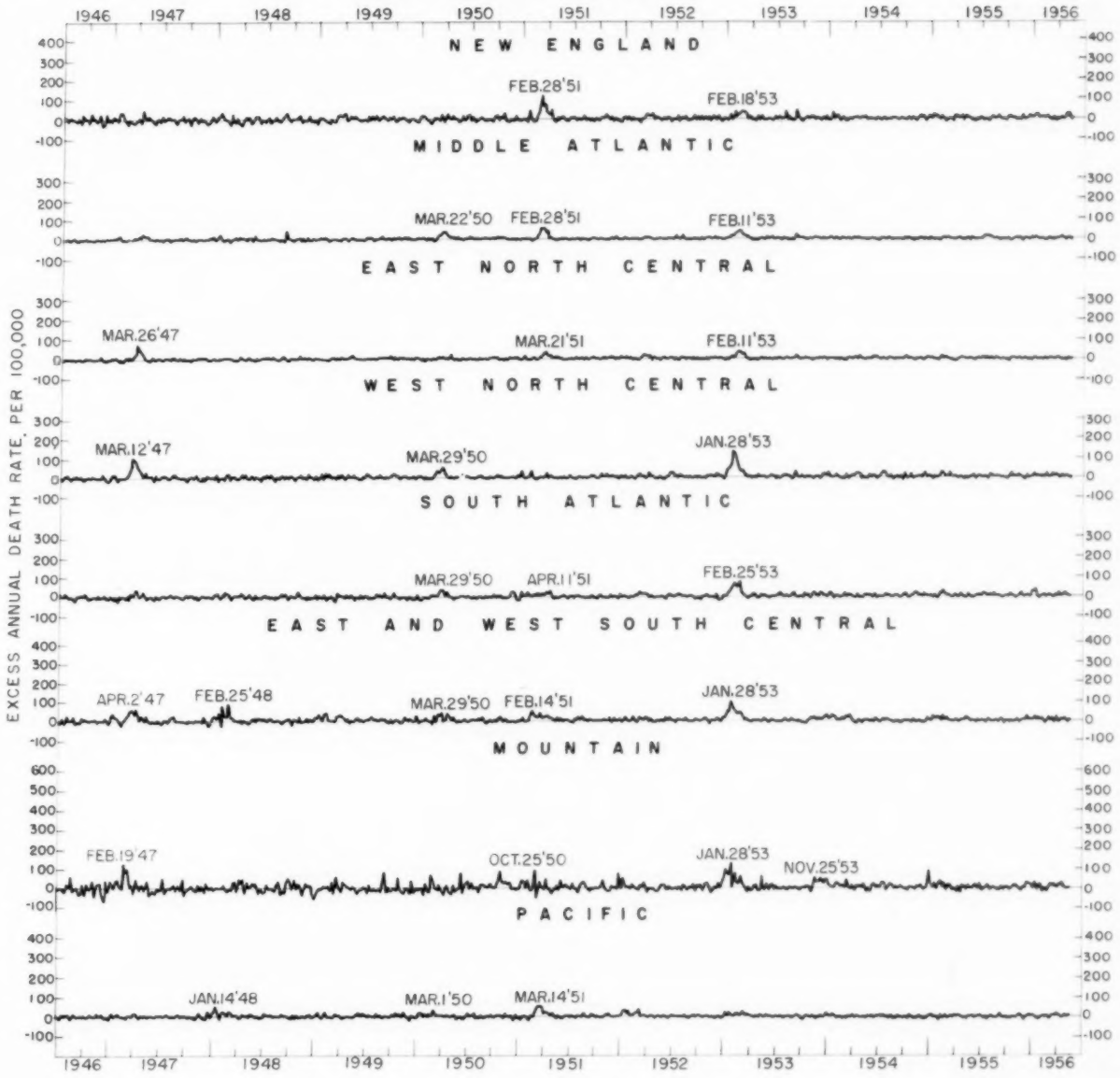
demic for the combined group of cities and for each geographic section where epidemics have occurred.

Excess Mortality in Geographic Sections

The weekly excess mortality from influenza and pneumonia, plotted for each of eight geographic sections from mid-August 1936 through mid-August 1956, is shown in figure 5. The United Sates census geographic sections are used in this study except that the East South Central and West South Central sections are combined. In 1950–51 there was no measurable excess of mortality from influenza and pneumonia in the West North Central section but moderate-sized epidemics are quite evident in all other sections.

In December 1952 some scattered outbreaks of influenza were reported to the Influenza Information Center and the National Office of Vital Statistics. By January 1953 these outbreaks had become quite widespread over the East and West South Central, the West North Central, and the Mountain sections, and in most of the States of the South Atlantic section

pneumonia in groups of cities in each geographic section, 1936–56.



(*10*, *11*). These four sections had the highest total excess mortality from influenza and pneumonia (fig. 5 and table 3). The epidemic of 1952–53 in the West North Central section, with a total excess mortality of 10.9 per 100,000 population, was the most severe of any outbreak in that region since 1943, although the mortality was only slightly higher than in the epidemic of 1947. The rates of excess deaths from these causes in 1953 in New England and the Middle Atlantic States were slightly lower than in 1951 and about the same in the East North Central section. The Pacific section had a total excess mortality from influenza and pneumonia in 1951 of 6.0 per 100,000 but was affected very little in 1953.

In the previous report (*3*), data for the Mountain section were available for only 2 large cities, but since 1950 weekly reports have been obtained from 6 additional cities. This adds about half a million population to the Mountain area and probably accounts for the fact that the deviations from the baseline are not as irregular as in previous years.

Although the yearly mortality rates for influenza and pneumonia for the geographic sec-

Table 4. Excess [1] weekly death rates (annual basis) per 100,000 from influenza and pneumonia, 1951–56, 62 cities [2]

Week of year	Smoothed mean	1951 [3]	1952	1953	1954	1955	1956
1	37	+4	0	+18	+10	+5	+6
2	38	+5	+6	+23	+2	−1	+9
3	39	−1	0	+29	−1	−1	+4
4	38	+2	−1	+44	+1	−2	−3
5	38	−4	−3	+47	−2	−1	−1
6	38	+2	−3	+49	−5	+6	−2
7	38	+10	−2	+43	+2	+6	−1
8	39	+10	−6	+34	−5	+5	−6
9	39	+33	0	+32	−6	+2	−1
10	40	+27	+5	+19	+1	−2	−2
11	40	+33	+8	+8	−3	−2	−4
12	40	+25	+4	+3	−2	−4	−4
13	39	+28	+4	−1	+3	−5	+1
14	38	+14	+4	−1	0	−1	+4
15	37	+11	−5	−1	−1	0	+1
16	36	+3	0	−1	+4	−3	−2
17	34	−1	−4	+1	+3	−2	−1
18	31	+2	−3	+2	−3	−2	+3
19	29	+1	−4	0	−4	−1	+1
20	28	+4	+2	+6	0	−1	0
21	27	−2	0	−3	−2	+3	
22	26	−1	−1	+1	+2	−1	
23	26	−1	0	+1	+1	−1	
24	25	0	+1	−2	+4	−2	
25	25	−1	+2	−1	+2	0	
26	25	−1	0	−1	−4	0	
27	25	−4	+7	0	−2	+6	
28	25	+1	0	−5	+2	+5	
29	25	−2	+1	+3	+1	+3	
30	24	−4	+6	−3	+2	+2	
31	24	+3	+1	−2	+3	+6	
32	23	−2	−4	−4	+2	+4	
33	22	0	0	−4	0	−1	
34	22	−2	+1	−3	−2	+2	
35	22	−2	−3	+14	−2	−2	
36	23	+1	−1	+11	−1	−6	
37	23	+4	−3	−2	0	−2	
38	23	+2	0	−1	−4	−4	
39	24	−1	−4	0	0	−5	
40	25	−2	0	−2	+5	−4	
41	26	−1	−3	−2	−1	−4	
42	26	+1	−1	0	−1	+1	
43	27	−2	+1	−1	−1	+1	
44	28	−2	+3	−3	−4	+1	
45	29	+1	+3	−1	−1	−1	
46	30	+1	0	+2	0	+5	
47	31	+2	+6	0	+2	−5	
48	32	0	0	0	+2	+1	
49	33	+1	+4	+2	−4	−2	
50	34	−3	+3	+5	+1	−1	
51	35	−1	+1	0	−1	+1	
52	36	+3	−2	+2	+4	+6	
53			+9				
Quarterly factors for adjustment of means to current nonepidemic level							
1st quarter (1st–13th weeks)		1. 223	1. 140	0. 773	0. 901	1. 009	1. 018
2d quarter (14th–26th weeks)		1. 150	1. 005	. 867	. 920	. 932	
3d quarter (27th–39th weeks)		1. 010	1. 013	. 985	. 922	1. 079	
4th quarter (40th–52d weeks)		1. 066	1. 014	. 958	. 986	1. 034	

[1] See footnote 1 to table 3. [2] See footnote 2 to table 3. [3] For years prior to 1951 see appendix table A of reference 3.

tions go up slightly for the first half of 1956 (fig. 3), the method used to determine excess mortality does not indicate an epidemic in any of the sections.

The weekly deviations in rates for all 62 cities in the study and the quarterly factors for adjustment of the normal seasonal curve to nonepidemic levels, from which these weekly deviations are derived, are shown in table 4.

Summary

The general trend of mortality from influenza and pneumonia has been downward since 1900, except during the great influenza pandemic of 1918–19. In 1900, the death rate from influenza and pneumonia was about 200 per 100,000 but by 1935 it had declined to about 100 per 100,000.

Beginning about 1937 with the advent of the sulfa drugs and, a few years later, of penicillin and aureomycin, the downward trend of deaths from influenza and pneumonia became more abrupt. In 1955 the provisional death rate for the United States from these causes was 27.5, a decline from 1935 of roughly 75 percent. The trend lines for the registration States and for the groups of cities reporting to the National Office of Vital Statistics have been consistently parallel and since 1937 lie very close together.

The same downward trend for the registration States and for the groups of all cities combined is seen in each geographic section.

Data on weekly mortality from influenza and pneumonia have been available for large cities in the United States since 1918. By the method used in this and previous studies to determine weekly excess mortality, there have been 21 epidemics since the 1918–19 pandemic. The most severe epidemics occurred in the decade 1920–29. The most widespread of these was early in 1920, with a total excess mortality of 99.3 per 100,000. Another severe epidemic occurred in the winter of 1928–29, with a total excess mortality of 44.4 per 100,000. In the next decade, the two most severe epidemics occurred in the winters of 1932–33 and 1936–37, with total excess mortality rates per 100,000 of 19.2 and 18.4, respectively. In the decade 1940–49, the only epidemic that compared in size with the epidemics of 1932–33 and 1936–37 was in the winter of 1943–44, when the total excess mortality from influenza and pneumonia was 14.4 per 100,000.

There have been two influenza epidemics since 1950. The first, in 1951, involved all geographic sections except the West North Central and had a total excess mortality of 3.8 per 100,000; the second, the most widespread since 1943–44, occurred in early 1953, with a total excess mortality rate of 6.9 per 100,000 for all cities combined.

• • •

Tables 5–12, giving the weekly deviations in mortality rates for influenza and pneumonia for the years 1951–56, are on file with the Division of Public Health Methods, Public Health Service, and may be obtained upon request.

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Social Security Changes Affecting the Disabled

Recent amendments to the Social Security Act extend to persons severely disabled before January 1, 1955, a year's leeway in applying for a "freeze" of their social security records. The application deadline has been advanced from June 30, 1957, to June 30, 1958.

The amendments also provide that veterans with service-connected disabilities may receive full social security disability insurance benefits along with their full disability compensation from the Veterans Administration.

Under the social security disability "freeze" provision, the years during which a worker has no earnings because of his disability are not counted in figuring the benefits payable to him or his family in the future.

Until the enactment of the new amendments, disabled veterans receiving compensation from the Veterans Administration for service-connected disabilities had their social security disability insurance benefits reduced by the amount of their veterans compensation payment.

The first social security disability insurance benefits are payable to disabled workers aged 50 to 65 beginning with the month of July 1957.

The new amendments do not change the provision requiring that social security disability insurance benefits be reduced by the amount of any veterans pension for non-service-connected disability. This offset of benefits is also made where a disabled worker is receiving another type of Federal payment for disability or disability payments under a Federal or State workmen's compensation law.

Protective Isolation of the Tuberculous

CONFERENCE REPORT

Compulsory isolation of the tuberculous patient was considered at a Conference on Protective Isolation of the Tuberculous, held at Denver, Colo., January 22–23, 1957.

The meeting was designed also to identify the elements of a model compulsory isolation law and to develop specifics applicable to the State of Colorado, or, if this was not advisable, to attempt to develop an alternative solution to the problem.

The recalcitrant tuberculous patient and the need for methods of dealing with him have been subjects of increasing concern in recent months. Attending the meeting were interested persons from many fields as well as representatives of numerous organizations from all over the United States. It was sponsored jointly by the Colorado Foundation for Research in Tuberculosis, Colorado State Medical Society, Colorado State Department of Public Health, Colorado Tuberculosis Association, Denver County Medical Society, Denver Department of Health and Hospitals, Denver Tuberculosis Society, National Tuberculosis Association, the University of Colorado School of Medicine, and the Public Health Service.

Chief participants in the conference were Dr. Lloyd Florio, manager of the Denver Department of Health and Hospitals and professor and head of

the department of preventive medicine, University of Colorado School of Medicine, moderator; Dr. Roger Mitchell, director of the Colorado Foundation for Research in Tuberculosis and associate professor of medicine, University of Colorado School of Medicine, chairman; Dr. Thomas Parran, former Surgeon General of the Public Health Service and present dean of the University of Pittsburgh Graduate School of Public Health, coordinator and summarizer; and Dr. Eric Wittkower, psychiatrist, Allan Memorial Institute, McGill University, Montreal, Canada, principal dinner speaker. Other participants were tuberculosis control officers, tuberculosis hospital directors, private practitioners, psychiatrists, sociologists, social workers, lawyers, nurses, and health educators.

Arguments Pro and Con

The first part of the 2-day session was devoted to a formal presentation of arguments in favor of and opposed to the use of forcible hospitalization. The case for compulsory hospitalization was led by Dr. Edward Kupka, chief, tuberculosis control, California State Department of Public Health. These arguments were offered:

1. Tuberculosis is a communicable disease spread from person to person. Its continued spread and the acquiring of new infections can be prevented by the identification and isolation of all grossly infectious persons.

2. The civil liberties of a citizen do not include the right to endanger the health and welfare of other citizens. It is a principle of law that the personal rights of an individual must at times be subservient to the common good.

3. Compulsory isolation can be recommended as a valid measure in the control of tuberculosis because it serves as a deterrent to other individuals with tuberculosis who might otherwise fail to cooperate.

4. The truly recalcitrant patient is both physically and mentally ill and at times needs the support of official action to help him take necessary precautions against infecting others. Some of these patients are so emotionally disturbed that commitment on psychiatric grounds is indicated.

5. The really recalcitrant patient is probably more dangerous to the public health than is the nonrecalcitrant known case. This is so because he is willfully neglectful of other people and makes no effort to protect his fellow men from infection. As the number of infectious tuberculous patients decreases, each such recalcitrant becomes relatively more important.

6. There is a small hard core of socially irresponsible persons who, in spite of a concerted psychosocial attack, will continue to expose their fellow men to infection unless restrained.

7. Basically democratic administration of isolation laws, like all laws, is a fair general assumption in the United States today.

8. Alternatives consist mainly in preventive measures which are too costly to be practical.

9. The program has worked well in those States with both a good overall tuberculosis control program and good facilities for compulsory isolation.

Dr. Sidney Dressler, medical director, National Jewish Hospital, Denver, led the case against compulsory hospitalization. His team set forth the following arguments:

1. Recalcitrance is not a crime and may reflect psychosocial disease in the patient or the failure of the professional staff to deal with this disorder, or both. Some of these problems are not due to any inadequacies within the patient, but result from improper handling by health officials.

2. Recalcitrance is usually preventable by proper medical, social, and psychiatric care.

3. Recalcitrants represent such a small fraction of the potential source of infection that the expenditure of time, effort, and money necessary for isolating them is not justified and might be better spent on other public health measures with a greater potential yield.

4. Enforced isolation as a rule does not make recalcitrant patients cooperative and, in fact, may drive tuberculosis underground and tend to create more recalcitrants.

5. There are adequate alternatives to enforced isolation.

6. Tuberculosis is only mildly contagious.

7. There is no evidence to show that compulsory isolation has succeeded in preventing additional cases or that incarceration has favor-

ably influenced the infection rate in a community.

8. Since most laws permit a wide degree of administration and many of the patients who would be prosecuted are unable to defend themselves, such laws could easily lead to abuse by authorities. Civil liberties may be unnecessarily lost or curtailed.

9. Tuberculosis control officials have ample tools for protecting the environment from the recalcitrant. They know who he is. The unknown tuberculosis cases are the main hazard to the populace. The institution of forcible hospitalization would add nothing more to tuberculosis control than would a more vigorous application of those control methods now in use.

Handling the "Recalcitrant"

In the general discussion of the subject and its ramifications the conference expressed widely divergent opinions concerning the definition and importance of and the approaches to the problem. No general agreement was reached as to what constitutes a "recalcitrant," but the term usually was used to refer to patients who continue to expose other people to infection, deliberately, after all persuasive efforts to the contrary have failed. It was recognized that this designation is too loosely applied and that further consideration is needed of methods for prevention as well as for protection of the community without doing more damage to the patient. The conference was in general agreement that compulsory isolation relates only to a few persons, that this number could undoubtedly be further reduced with conscientious efforts, and that recalcitrance is not confined to one segment of our population, for instance, "the skid row bum," but may occur in any segment or socioeconomic group.

Methods of handling the recalcitrant tuberculous vary in different parts of the country. A few examples of the different types of experiences are fairly representative. In one area, it was reported, all tuberculosis patients who have had at least 1 to 10 opportunities to adjust to voluntary hospitalization are committed to a sanatorium operated under the aegis of the sheriff's department. If they leave this sanatorium against advice after admission on an isolation order, they are arrested and may go to jail or back to the sanatorium depending on the circumstances and the sanatorium director's decision. This sanatorium has a special locked ward for the really antisocial and destructive patients where the same treatment is provided and disruption of the other wards is prevented. Good results are reported from 50 to 60 percent of the patients who change their attitudes or respond temporarily for the sake of expediency.

In another State a law makes refusal of examination a misdemeanor, but no penalty is stated and it is not known if the law is ever enforced. It is a misdemeanor in this same State for a tuberculous person to fail to follow his health officer's advice in regard to preventing the spread of tuberculosis to other persons, or to refuse to enter a sanatorium or hospital when this is found by the health officer to be necessary for the prevention of the spread of the disease. The sentence for this can be 2 years in the prison division of the sanatorium, subject to suspension if the patient enters a sanatorium. The patient can apply for parole from the prison division of the sanatorium after 60 days or for transfer to a State, county, or Federal sanatorium. He receives automatic release when medical conditions warrant. This same State also has a plan whereby the patient can be treated at home by a private physician.

In another State, if a suspect refuses examination, the judge appoints three doctors to examine him. If diagnosis of tuberculosis is confirmed, the person then is committed to the sanatorium until he is no longer a menace. About 100 patients are under isolation orders in this sanatorium, but there are only 54 beds in the locked ward. The committed patients are initially admitted to this ward and observed for 6 to 8 weeks by physicians and nurses. At the end of this time, if it is felt that the patient's attitude has changed and it is possible that he can be trusted on an open ward, he then is transferred and handled on the open ward as any other patient of the hospital. If this trust is not upheld or he leaves or attempts to leave the hospital against ad-

vice, he again is returned to the locked ward. The hospital personnel then carefully explain to him that this procedure is not punitive but is for the protection of himself, the hospital, and the public. A committed patient is never given a medical discharge until he is listed as having inactive disease and consultation has been held with the county health officer in the jurisdiction in which he resides. A really refractory patient may be kept in the locked ward throughout his entire period of hospitalization. The locked ward has no guards or bars and the same facilities are provided patients there as are provided those on the open ward. Visiting takes place through a screen to prevent the transmission of forbidden articles such as liquor and narcotics. An electronic eye is situated at that point to set off an alarm if any patient attempts to escape.

In one large city where compulsory isolation of persons with tuberculosis who fail to cooperate with the public health authorities has been in use since 1940, an average of 63 persons have been committed each year. The accused person is brought to a court hearing by subpena. If he does not appear in court, and about 50 percent do not, the judge issues a bench warrant instructing the police department to apprehend him and take him to the hospital. If the patient should escape or again become uncooperative with regard to medical management of his disease, a similar warrant is issued for his arrest and recommitment. No limit is set by the court on the duration of compulsory isolation, and the patient is discharged at the discretion of the medical director of the hospital on the recommendation of the chief of the locked ward service.

The locked ward is one of several large multibed wards for the tuberculous. Heavily screened doors, leading to and from that wing of the hospital, are locked and guarded by policemen. There are 23 beds on the ward, and the census varies from 15 to capacity. Most of the patients are social misfits, such as homeless men and skid row alcoholics, but a significant number have permanent homes and families. Most of them have moderately or far advanced disease, usually with cavitation and bilateral involvement.

Elements of Good Control

The philosophies expressed as well as the experiences described indicated the complexity of this problem. There were strong beliefs that the use of punitive methods (and that forcible isolation *is* punitive) is ineffectual in, if not actually detrimental to, tuberculosis control. The opposite point of view was expressed with equal conviction—that authority is a basic requirement for an adequate program. No differences of opinion were expressed, however, about the need to improve services and facilitate care, as an initial step in the prevention of recalcitrance among the tuberculous.

The following list of some of the elements of a good tuberculosis control program was submitted and approved unanimously:

- Abolition of the means test.
- Relaxation of residence requirements, especially where emergency treatment is needed.
- Good hospital facilities.
- Modern therapeutic methods.
- A reasonable freedom of choice among available facilities—as to location, convenience to the patient's home, and other considerations.
- The use of home care for suitable patients with treatment by the physician of the patient's choice.
- Adequate public assistance to the family.
- A well-rounded rehabilitation program.
- Effective and continuous psychological, psychiatric, and social service care.
- Education of the physician, especially since the role of the private physician in the treatment of tuberculosis is increasing.
- Strong public health services, including diagnostic facilities and the furnishing of drugs to physicians for patients entitled to them.
- Continuation of medical supervision of the tuberculosis patient by the health agencies.
- Coordination of all services, including education of the public, the legal profession, and the judiciary, in all aspects of the tuberculosis control program.
- The psychiatrist's continuing and important part in the prevention of unwillingness on the part of the patient to take treatment.
- Understanding attitudes on the part of all personnel, including individualization rather

than categorization of patients, and recognition that the patient's failure to accept recommendations often reflects improper handling rather than solely the patient's social and emotional disturbances.

The conference agreed unanimously on the statement:

"The conference deplores the use of compulsion as a substitute for adequate preventive and therapeutic measures of tuberculosis control including medical treatment, hospitalization, psychiatric treatment, public assistance, and social service. It recognizes, however, that in spite of such measures, occasional use of compulsion may be necessary in order to implement the total program."

The elements of a model protective isolation law were discussed, but time did not permit complete exploration of this topic and no general agreement was reached. The conference pointed out that all States have old statutes dealing with communicable diseases that are applicable to tuberculosis and did not decide that new legislation for the isolation of the tuberculous recalcitrant was needed.

The conference recommended that the Public Health Service undertake studies designed to determine the extent and importance of the problem of the recalcitrant viewpoint, and to make an objective appraisal of the design and operation of compulsory isolation programs in a number of States and communities for the purpose of identifying those factors which contribute to the success or failure of such programs.

This conference report was prepared by the staff of the Tuberculosis Program of the Public Health Service from the transcript of the discussion and from written material submitted by the participants.

New Policy of National Library of Medicine

Requests for material from the National Library of Medicine must now be channeled through a medical or public library under a regulation effective September 1, 1957. The new rules unify interlibrary loans and photoduplication services. They are intended to make medical literature available more promptly wherever it is needed.

Beginning in September 1957, the library will—

1. Lend materials on an interlibrary loan basis only.
2. Determine whether to lend the material in the original form or as photoduplicates (microfilm or photoprints).
3. Allow borrowing libraries to retain loans furnished in the form of photoduplicates.
4. Furnish all such services free of charge, but will expect the borrowing library to pay postage charges for the return of borrowed books.

On the other hand, the National Library of Medicine will not—

1. Lend material to individuals; they are expected to direct their requests to their local libraries for transmittal.
2. Sell photoduplicates, except by special arrangement, usually for material in the history of medicine or art collections.
3. Furnish photocopy loans where the material is available to the borrower locally.

Details of the revised rules are obtainable from the Loan Librarian, National Library of Medicine, 7th Street and Independence Avenue SW., Washington 25, D. C.

STATEMENT BY SURGEON GENERAL LEROY E. BURNEY

Excessive Cigarette Smoking

The Public Health Service is, of course, concerned with broad factors which substantially affect the health of the American people. The Service also has a responsibility to bring health facts to the attention of the health professions and the public.

In June 1956, units of the Public Health Service joined with two private voluntary health organizations to establish a scientific Study Group to appraise the available data on smoking and health. We have now reviewed the report of this Study Group and other recent data, including the report of Dr. E. C. Hammond and Dr. Daniel Horn on June 5 to the American Medical Association in New York.

In the light of these studies, it is clear that there is an increasing and consistent body of evidence that excessive cigarette smoking is one of the causative factors in lung cancer.

The Study Group, appraising 18 independent studies, reported that lung cancer occurs much more frequently among cigarette smokers than among nonsmokers, and there is a direct relationship between the incidence of lung cancer and the amount smoked. This finding was reinforced by the more recent report by Dr. Hammond and Dr. Horn.

Many independent studies thus have confirmed beyond reasonable doubt that there is a high degree of statistical association between lung cancer and heavy and prolonged cigarette smoking.

Such evidence, of course, is largely epidemiological in nature. It should be noted, however, that many important public health advances in the past have been developed upon the basis of statistical or epidemiological information. The Study Group also reported that in laboratory studies on animals at least five independent investigators have produced malignancies by tobacco smoke condensates. It also reported that biological changes similar to those which take place in the genesis of cancer have been observed in the lungs of heavy smokers. Thus, some laboratory and biological data provide contributory evidence to support the concept that excessive smoking is one of the causative factors in the increasing incidence of lung cancer.

At the same time, it is clear that heavy and prolonged cigarette smoking is not the only cause of lung cancer. Lung cancer occurs among nonsmokers, and the incidence of lung cancer among various population groups does not always coincide with the amount of cigarette smoking.

The precise nature of the factors in heavy and prolonged cigarette smoking which can cause lung cancer is not known. The Public Health Service supports the recommendation of the Study Group that more research is needed to identify, isolate, and try to eliminate the factors in excessive cigarette smoking which can cause cancer.

The Service also supports the recommendation that more research is needed into the role of air pollution and other factors which may also be causes of lung cancer in man.

To help disseminate the facts, the Public Health Service is sending copies of this statement, the Study Group report, and the report of Dr. Hammond and Dr. Horn to State health officers and to the American Medical Association with the request that they consider distributing copies to local health officers, medical societies, and other health groups.

While there are naturally differences of opinion in interpreting the data on lung cancer and cigarette smoking, the Public Health Service feels the weight of the evidence is increasingly pointing in one direction: that excessive smoking is one of the causative factors in lung cancer.

The Service notes that the Study Group found that more study is needed to determine the meaning and significance of any statistical association between smoking and heart disease. The Study Group reported there is no convincing biological or clinical evidence to date to indicate that smoking per se is one of the causative factors in heart disease. Although the report by Dr. Hammond and Dr. Horn has since provided additional data on this subject, the Service feels that more statistical and biological data are needed to establish a definite position on this matter.

July 12, 1957

Copies of the report Smoking in Relation to Death Rates, by Dr. E. C. Hammond and Dr. Daniel Horn, and the Joint Report of the Study Group on Smoking and Health are available from the Division of Public Inquiries, Public Health Service.

Organic phosphorus insecticides may cause mild illnesses in persons working closely with the materials, but they did not constitute any hazard for residents surveyed recently in Wenatchee, Wash.

Exposure to Organic Phosphorus Sprays and Occurrence of Selected Symptoms

WAYLAND J. HAYES, Jr., M.D., Ph.D., ERNEST M. DIXON, M.D., GORDON S. BATCHELOR, M.S., and WILLIAM M. UPHOLT, Ph.D.

PESTICIDES are used intensively in agriculture in the vicinity of Wenatchee, Wash. Direct measurement of dermal and respiratory exposure of sprayer operators in this area to parathion was reported by Batchelor and Walker in 1954 (*1*). A survey designed to evaluate the hazard of organic phosphorus insecticides was carried out in this same locality during 1951 (*2*). It was found that definitely exposed persons showed a significant reduction in average cholinesterase values and an increase in illnesses consistent with poisoning during the period of their exposure. There was no evidence of either reduced cholinesterase activity or increased illness during the spray season in persons with little or no exposure to insecticides.

This survey was continued during the 1952 and 1953 seasons. The present paper presents the results of that work.

Dr. Hayes is chief of the Toxicology Section, Technical Development Laboratories, Communicable Disease Center, Public Health Service, Savannah, Ga. Dr. Dixon was stationed at the CDC Wenatchee Field Station, Wenatchee, Wash., when this study was made. He is now at the Kettering Laboratory, University of Cincinnati College of Medicine. Mr. Batchelor was the entomologist for the Wenatchee Field Station, and is now with the Allied Chemical and Dye Corp. in Wenatchee. Dr. Upholt is chief of the Wenatchee Field Station.

Kenneth C. Walker, a chemist at Wenatchee, determined the cholinesterase activity of the blood samples for the study, and Dr. William F. Durham, a biochemist at the CDC laboratories in Savannah, assisted in preparing the report. Dr. J. Monte Johnston and Dr. W. T. Sumerford participated in the early phases of the surveys while they were stationed at Wenatchee.

Materials and Methods

The procedure was essentially the same as that used in the 1951 survey (*2*). The subjects were again grouped according to decreasing potential exposure as follows: mixing-plant personnel (MPP), commercial applicators (CA), part-time applicators (PTA), workers in orchards (WO), fieldmen, warehousemen, and miscellaneous workers (FWM), residents living near orchards (RNO), residents of Wenatchee area living far from orchards (RFO), and a control group of residents living completely outside the agricultural area (ROA).

The four exposure periods were again based on the best information which could be obtained regarding exposure to insecticides for each individual. The observations on the potentially

exposed groups (RNO and RFO) and the definitely unexposed group (ROA) were divided into periods based on the observed periods of exposure for the exposed groups. The periods were preexposure, exposure, recovery (arbitrarily taken as the 30-day period immediately following the last exposure of the season), and postrecovery. Also included in the recovery period were any data obtained from a person known to be in a convalescent state following poisoning, provided that he avoided further exposure.

In 1952, 228 persons were studied, including 100 of the same subjects studied in 1951. A total of 923 blood samples were analyzed for erythrocyte and 927 for plasma cholinesterase activity, using the electrometric method of Michel (*3*). Two hundred and twenty of the subjects were interviewed periodically for symptoms, as well as history of exposure.

In 1953, 239 persons in four of the groups were studied: commercial applicators (34 persons), residents near orchards (62 persons), residents far from orchards (107 persons), and residents outside the area (38 persons). These groups were selected to represent occupationally exposed (CA), potentially environmentally exposed (RNO and RFO), and definitely unexposed (ROA) populations. Cholinesterase determinations were not carried out on these subjects. In this year an effort was made to achieve greater statistical significance for the survey of symptoms by (*a*) increasing the number of observations in each group and (*b*) equalizing, insofar as possible, the number of observations from the various exposure periods. Most of the participants were interviewed each month, starting in some instances as early as March and extending through November or December. In an effort to assure as much uniformity of sampling as possible between the exposure periods, no individual participant was included in the final tabular summary unless he had been interviewed at least once in each of three periods, including both the preexposure and the exposure periods.

Cholinesterase Values

The results of the cholinesterase activity determinations are given in table 1. The groups with occupational exposure (MPP, CA, PTA, and WO) showed a definite decrease in plasma cholinesterase levels and some diminution in erythrocyte enzyme values during the exposure period. Though the decrease in mean values was not great in any group, it was largest in the group with the heaviest exposure, the mixing-plant personnel. The lowest values (cells, 0.05; plasma, 0.09) encountered during the exposure period were in a person living near an orchard. These extremely depressed cholinesterase activity levels were the result of a near-fatal, acute case of organic phosphorus poisoning suffered by a 2-year-old child who had played with a can from which the original contents of 25 percent emulsifiable parathion concentrate had not been completely removed. The poisoning incidents reported by Johnston (*4*) and Dixon (*5*), as well as several unpublished cases, support the conclusion that, although extensive day-to-day exposure is regularly associated with reduced blood cholinesterase activity, the only fatal and near-fatal cases of poisoning which were found were associated not with long-standing exposure but with brief, massive exposure and gross carelessness.

In the recovery period, the average plasma enzyme values of 3 of the 4 occupationally exposed groups (MPP, PTA, and WO) had returned essentially to their normal levels. The commercial applicators still showed a somewhat depressed average plasma cholinesterase level at this time. For two of the groups with greatest exposure (MPP and CA), the erythrocyte enzyme levels were still significantly subnormal during the recovery period.

Few postrecovery samples were obtained. The values found were all in the expected range except for one low plasma value for a single resident near an orchard. This low plasma value, which was associated with a normal red cell value, must be considered characteristic of the individual in question because it continued low after an appreciable time with no possible exposure.

It is of interest to note that the average preexposure cholinesterase levels of individuals living in an intensively sprayed area are essentially the same as those of individuals living in unsprayed areas. The three less-exposed

Table 1. Cholinesterase values for various occupational and control groups in relation to exposure to organic phosphorus insecticides, Wenatchee, Wash., 1952

Group	Number of people	Number of samples	Cholinesterase values (Δ pH/hour)					
			Red blood cells			Plasma		
			Range	Mean	Standard error	Range	Mean	Standard error
Preexposure period								
MPP	7	11	0. 60–0. 92	0. 73	0. 03	0. 50–1. 18	0. 74	0. 06
CA	16	28	. 61– . 81	. 70	. 01	. 66–1. 26	. 91	. 03
PTA	39	49	. 57– . 90	. 71	. 01	. 40–1. 18	. 85	. 01
WO	14	14	. 57– . 84	. 70	. 02	. 54–1. 12	. 83	. 04
FWM	12	21	. 58– . 86	. 73	. 02	. 53–1. 36	. 90	. 04
RNO	21	31	. 61– . 90	. 72	. 01	. 45–1. 17	. 80	. 04
RFO	12	26	. 50– . 84	. 72	. 01	. 61–1. 02	. 85	. 01
ROA [1]	14	38	. 64– . 88	. 73	. 01	. 54–1. 28	. 92	. 04
Exposure period								
MPP	8	24	0. 15–0. 80	0. 62	0. 03	0. 14–0. 81	0. 57	0. 04
CA	30	84	. 21– . 92	. 64	. 03	. 14–1. 10	. 67	. 03
PTA	59	[2] 165	. 41– . 90	. 68	. 01	. 26–1. 26	. 79	. 01
WO	13	[3] 36	. 54– . 84	. 68	. 01	. 49–1. 05	. 74	. 02
FWM	29	79	. 45– . 89	. 71	. 01	. 36–1. 62	. 86	. 03
RNO	28	110	. 05– . 94	. 69	. 03	. 09–1. 19	. 76	. 06
RFO	15	59	. 50– . 86	. 69	. 01	. 58–1. 02	. 81	. 02
ROA [1]	14	[4] 59	. 58– . 84	. 70	. 01	. 48–1. 27	. 90	. 03
Recovery period								
MPP	2	2	0. 52–0. 70	0. 60	0. 07	0. 75–0. 81	0. 78	0. 03
CA	16	22	. 09– . 86	. 53	. 05	. 05–1. 15	. 69	. 05
PTA	14	[5] 14	. 38– . 82	. 67	. 03	. 52–1. 09	. 79	. 05
WO	3	3	. 62– . 72	. 69	. 20	. 59–0. 92	. 78	. 10
FWM	5	5	. 61– . 82	. 72	. 04	. 46–1. 08	. 83	. 10
RNO	6	7	. 18– . 80	. 55	. 09	. 26–1. 14	. 70	. 12
RFO	2	2	. 71– . 74	. 72	. 02	. 96–0. 98	. 97	. 00
ROA [1]	9	9	. 60– . 86	. 73	. 04	. 59–1. 26	. 94	. 08
Postrecovery period								
MPP								
CA	7	7	0. 48–0. 90	0. 66	0. 18	0. 68–1. 15	0. 83	0. 06
PTA	4	4	. 55– . 78	. 66	. 05	. 76–1. 02	. 92	. 07
WO	1	1		. 78			. 87	
FWM	4	4	. 59– . 80	. 70	. 04	. 67–1. 32	. 97	. 14
RNO	1	1		. 64			. 48	
RFO	1	1		. 76			. 69	
ROA [1]	11	11	. 66– . 92	. 75	. 02	. 60–1. 27	. 98	. 07

[1] The averages for the year in this group were 0.72 for cells and 0.92 for plasma. Although this group was not exposed to the spray chemicals under investigation, the cholinesterase values were distributed on the basis of collection date to the four periods set up for the exposed groups. This distribution provided a control for any potential seasonal variation in cholinesterase values.

[2] Only 164 red cell values available.

[3] Only 35 red cell values available.

[4] Only 58 red cell values available.

[5] Only 13 red cell values available.

Table 2. Occurrence of illness and of selected symptoms among various occupational and control groups in relation to exposure to organic phosphorus insecticides, Wenatchee, Wash., 1952

Group	Number of people	Number of illnesses	Percent of persons with illness	Percent of observed illnesses exhibiting— Selected symptoms: Headache	Nausea	Weakness or fatigue	Pain or tightness in chest	Abdominal pain	Vertigo, fainting, or incoordination	Vomiting	Nervousness, drowsiness, or insomnia	Sweating	Cough or expectoration	Disturbance of vision	Loss of appetite	Shortness of breath	Nasal discharge, including postnasal drip	Myosis	Wheeze	At least 1 selected symptom	Myosis or at least 3 other selected symptoms
Preexposure period																					
MPP	8	2	25													50				50	0
CA	30	13	43	31				8				8	15	8		8	31			62	0
PTA	39	19	53	5	5		11	11					21			5			5	32	5
WO	7	4	57	50										25						75	25
FWM	12	5	41									20		20			20			20	0
RNO	83	77	93	26	4	5	8	3	5	3	21	1	14	5	3	6	40		3	78	16
RFO	119	116	97	30	6	10	8	9	2	4	23	1	22	3	5	3	30		2	76	17
ROA	57	47	82	19	4	4	2	8		2	23		13	2		6	19		2	51	13
Exposure period																					
MPP	8	6	75	17		33	50						50			33		50	50	67	67
CA	68	60	88	52	13	13	33	5	5	2	10	2	23	15	8	15	20	55	18	85	48
PTA	59	48	81	50	25	54	14	12	23	12	19	14	25	12	14	10	10	12	4	75	33
WO	12	7	58	28	28	28			28	14	28	28	71	28	28	14	28		14	71	57
FWM	28	20	75	30	5	20	40	15	15		20	20	25	10	10	25	25	5	15	90	25
RNO	90	90	100	30	6	14	3	3	4	3	22		26	4		3	40	1	6	66	23
RFO	122	117	96	40	8	15	9	12	3	6	26	3	24	2	5	6	43		3	83	27
ROA	59	49	83	12	6	8		12	2	4	18		14	2			26		2	57	12
Recovery period																					
MPP	2	0	0																		
CA	38	22	58	23	55	18	18	9	5	5		9	23	9	5		18	5		73	14
PTA	14	8	57	75	12	50		12	12	25	12	12	25	12		12	12	12		75	25
WO	3	3	100				33						33				67		33	67	67
FWM	5	2	40				50						100				50			100	50
RNO	54	48	89	23	2	10	2	6	4	4	25		12			2	31	2	6	62	15
RFO	98	93	95	11	4	10	3	8		1	12	2	13	1	4	3	24		2	55	11
ROA	49	37	76	11		5		8			8		11				19		3	41	5
Postrecovery period																					
MPP	0	0	0																		
CA	41	21	51	14			5	5			5		24				33			71	0
PTA	4	4	100				25		25				25				25			75	25
WO	1	0	0																		
FWM	4	1	25																	0	0
RNO	63	61	97	26	10	20	2	11	2	10	2		25	2	2		48			66	21
RFO	101	94	93	21	10	14	3	13		7	10		24	2	3	2	50			71	20
ROA	61	54	89	15	13	13	2	13		13	9	2	22		11	2	37			56	22

NOTE: Values are zero unless otherwise indicated.

groups (FWM, RNO, and RFO) as well as the definitely unexposed population (ROA) remained normal during all periods.

Symptomatology

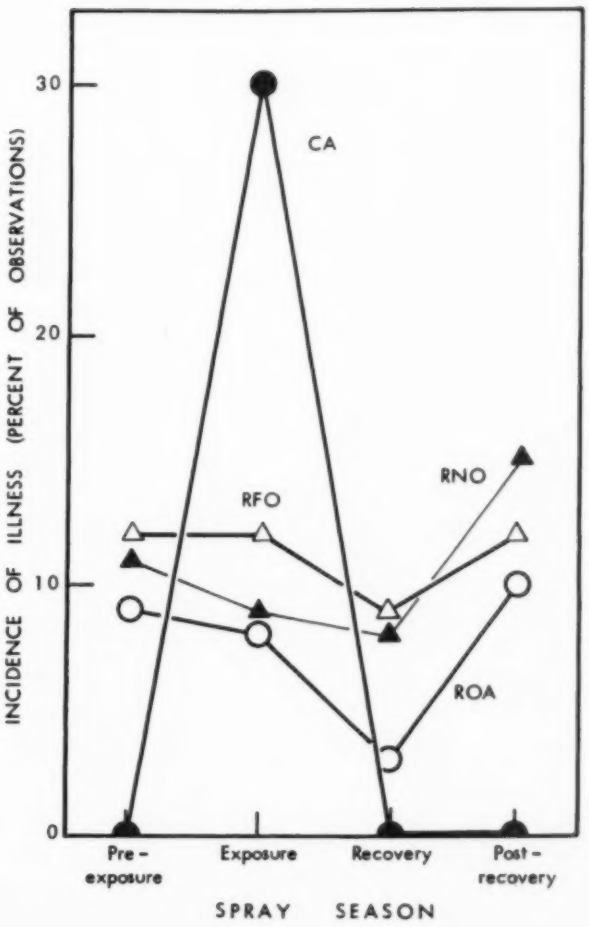
The symptoms recorded during the 1952 survey are tabulated in table 2 in the same form used in the earlier study (*2*). The distribution of the nonspecific symptoms throughout the various groups and throughout the four periods showed no particular pattern. In contrast the selected symptoms listed in the table were noted much more frequently during the exposure period. This finding indicates that mild illnesses involving symptoms similar to those characteristic of organic phosphorus intoxication were significantly increased during the exposure period. However, on the basis of the 1952 survey, as was also true for the 1951 study, it was not possible to differentiate clearly among the various potentially exposed groups with respect to the incidence of this type of illness. In an effort to solve this problem, the protocol of the survey was modified somewhat for 1953, as described above.

The symptoms recorded during the 1953 survey are shown in table 3. In this tabulation the incidence of symptoms and of illnesses is based on the number of observations, not on the number of illnesses or the number of persons as in table 2.

The incidence of all illnesses revealed that the commercial applicators were generally "healthier" than either the environmentally exposed groups or the unexposed group. The unexposed group had a slightly lower incidence of symptoms and of illnesses in all four periods than did the environmentally exposed groups (RNO and RFO). This lower incidence, however, is considered to be unrelated to exposure since these groups were different with respect to their potential contact with insecticides only during the exposure period.

The increase in illnesses among the commercial applicators during the exposure period was a result of an increase during this period in the selected symptoms known to be associated with intoxication by organic phosphorus compounds. The difference between periods was most apparent for the frequency of headache, nausea, pain or tightness in the chest, and myosis. The significance of this trend can be seen by considering the incidence of myosis or of illnesses involving three or more of the other selected symptoms. As explained in the earlier report, the occurrence of myosis or of three or more other selected symptoms is a stronger indication of intoxication from organic phosphorus insecticides than is the occurrence of unselected symptoms or of any single symptom other than myosis. Each of the selected symptoms other than myosis occurs quite commonly as a result of conditions unrelated to exposure to insecticides, but they are not so likely to occur in combination without easily recognized etiology.

Incidence of illness involving myosis or at least three other selected symptoms among groups occupationally exposed (CA), environmentally exposed (RNO and RFO), or unexposed (ROA) to organic phosphorus insecticides, Wenatchee, Wash., 1953.



The incidence of myosis or of three or more of the other selected symptoms is shown in figure 1, as well as in table 3, for each of the groups. Especially in view of the generally lower incidence of symptoms of any kind among the commercial applicators, the great rise in this group in the incidence of illnesses involving myosis or three or more other selected symptoms during the exposure period is striking. Actually, 7 of the 8 illnesses in this group could be clearly correlated with known heavy exposure to either parathion or tetraethyl pyrophosphate. Six of them included myosis as well as two or more other selected symptoms. The eighth case was presumably a respiratory infection that was epidemic at that time.

Since the number of commercial applicators was very small, data for 18 such workers not included in the above analysis because they were missed in the preexposure period were also examined. These 18 were observed in the exposure period and at least once in the recovery or postrecovery periods. As shown in table 4, the inclusion of the observations for

Table 3. Occurrence of illness and of selected symptoms among various occupational and control groups in relation to exposure to organic phosphorus insecticides, Wenatchee, Wash., 1953

Group	Number of people	Number of observations	Percent of observations revealing—																			
			Selected symptoms																Any illness	At least 1 selected symptom	Myosis or at least 3 other selected symptoms
			Headache	Nausea	Weakness or fatigue	Pain or tightness in the chest	Abdominal pain	Vertigo, fainting, or incoordination	Vomiting	Nervousness, drowsiness, or insomnia	Sweating	Cough or expectoration	Disturbance of vision	Loss of appetite	Shortness of breath	Nasal discharge, including postnasal drip	Myosis	Wheeze			
	Preexposure period																				
CA	16	20	15				5					15	5		10	5			70	30	0
RNO	62	108	17	2	3	5	2	2	2	17		12	3	1	6	32		3	98	61	11
RFO	107	178	22	4	8	7	6	2	4	21		18	2	4	2	25		2	97	67	12
ROA	38	56	16	5	7	2	2		4	9		14	2		4	20			82	45	9
	Exposure period																				
CA	16	27	37	11	4	18		4	4	4		7	4		4	22	18		81	56	30
RNO	62	159	19	2	6	1	2	3	1	18		15	1		1	26		2	98	57	9
RFO	107	268	23	3	7	4	6	1	2	19		14		3	2	24		1	94	62	12
ROA	38	65	9	5	6		6	2	3	12		8				22			86	42	8
	Recovery period																				
CA	11	11	9			18	9						9			27			91	64	0
RNO	48	48	20	2	8		6	2	2	22		10			2	28		2	88	52	8
RFO	96	96	9	4	7	3	7		1	11	1	13	1	4	3	22		2	95	51	9
ROA	32	32	9		3		6			6		6				16			78	34	3
	Postrecovery period																				
CA	16	26					8					4				15			65	31	0
RNO	62	110	20	6	12		8	1	6	1		17	1	1		35			95	49	15
RFO	100	184	13	5	10	2	7		4	7		15	1	2	2	28			89	49	12
ROA	38	70	11	9	7		7		9	3		10		7		20			84	31	10

NOTE: Values are zero unless otherwise indicated.

Table 4. Occurrence of illness and of selected symptoms among persons occupationally exposed to organic phosphorus insecticides, Wenatchee, Wash., 1953

Item	Exposure period	Recovery period	Post-recovery period
Number of individuals	34	22	34
Number of observations	55	22	51
Percent of observations revealing any illness	87	86	63
Percent of observations revealing at least 1 selected symptom	67	59	33
Percent of observations revealing myosis or at least 3 other selected symptoms	36	5	0

this group with those for the original group increases somewhat the incidence of illnesses involving at least one selected symptom and the incidence of myosis or of at least three other selected symptoms during the exposure period. Thus it strengthens the conclusion that there was a highly significant increase in this type of illness among occupationally exposed individuals during the period of exposure.

The occurrence of three or more selected symptoms was slightly more frequent among the environmentally exposed groups (RNO and RFO) than among the unexposed group (ROA) in all periods. (None of these groups reported myosis.) As suggested above, however, this difference was probably due to uncontrolled variables. Twelve of the eighteen illnesses involving three or more selected symptoms in the unexposed group were fairly definitely associated with etiologies unrelated to intoxication. Ten of the twelve were diagnosed as influenza or upper respiratory infection. One person had an operation for an intestinal obstruction, and another had cardiovascular disease. It is significant that of the 6 illnesses that were not adequately explained, 3 occurred in the preexposure period, 2 in the postrecovery period, and only 1 in the exposure period.

Of the 46 illnesses with three or more selected symptoms (but no myosis) found in the residents near orchards, 35 were fairly clearly associated with etiologies unrelated to insecticide exposure. These included upper respiratory infection, known allergies, pregnancy, peptic ulcer, and scarlet fever. The 11 that were not adequately explained were distributed 3 in the preexposure period, 3 in the exposure period, 1 in the recovery period, and 4 in the postrecovery period.

There were 84 illnesses revealing three or more selected symptoms (but no myosis) among the residents far from orchards; of these illnesses, 42 could be associated with etiologies unrelated to insecticide exposure, including about the same ones as those found in residents near orchards. Of the 42 illnesses that were not adequately explained, 15 occurred in the preexposure period, 16 in the exposure period, 6 in the recovery period, and 5 in the postrecovery period. With such a distribution there would seem to be little, if any, basis for associating these unexplained illnesses with exposure to insecticides.

Summary and Conclusions

A study of the effect of exposure to organic phosphorus insecticides carried out during 1952 and 1953, using some of the same subjects as those observed by Sumerford and his colleagues in 1951 (*2*), confirmed the previously demonstrated relationships between blood cholinesterase levels, exposure, and illness. It also provided further evidence that the occurrence of myosis or three or more other selected symptoms is a criterion for the differential diagnosis of mild poisoning. None of the results of the new investigation contradicted any conclusion stated in the first report.

In addition to these confirmatory findings, the present study showed clearly for the first time that illness resembling mild poisoning was not significantly more common in persons living in an agricultural community who had no occupational or gross accidental exposure than it was in persons living in a nonagricultural area, where insecticides were not used.

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PHS films

Clinical Manifestations of Leprosy

Part I. Tuberculoid Type

Part II. Lepromatous, Indeterminate, and Borderline Types

35-mm. filmstrip, color, silent with captions, 50 and 54 frames, respectively, 1956.

Audience: Physicians, public health officers, nurses, and medical students.

Part I of the filmstrip consists of a series of examples of tuberculoid lesions, each with a brief descriptive caption. The examples are limited to those found in the Westfort Institution, Pretoria, South Africa, and nearly all the patients are Negroes.

Part II shows 20 cases of the lepromatous type, 17 indeterminate, and 7 borderline, all Negro patients in the same institution. Each has its appropriate caption.

Refuse Disposal by Sanitary Landfills

16-mm. film, color, sound, 13 minutes, 472 feet. 1957.

Audience: Environmental sanitation personnel and other public health workers, municipal officials and civic groups.

The contributions of the sanitary landfill to community progress and public health are contrasted in this film with the faults of other disposal methods, such as open dumps, carrying vectorborne disease and nuisance hazards.

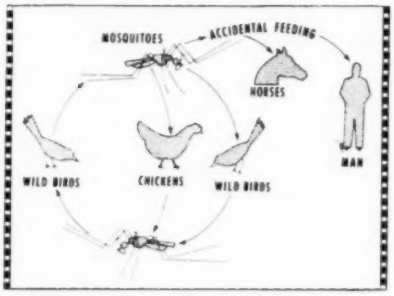
Children play on site of former landfill.

How to select a site, types of equipment used in landfilling, how to construct the fills, and different types of operating procedures are delineated.

Arthropod-Borne Encephalitis

16-mm. film, color, sound, 17½ minutes, 629 feet. 1957.

Audience: Epidemiologists, sanitary engineers, insect and rodent control personnel, and medical students.



The nature, significance, distribution, and known control measures for arthropod-borne encephalitis are delineated in this introductory film. The definition and importance of the disease, the three types and where they are found, human and equine cases, and temporary and permanent control measures are covered. The usual cycle of encephalitis transmission is from mosquitoes to wild birds. Infection of man and horses is believed accidental.

PHS films may be obtained on LOAN from the Communicable Disease Center, Public Health Service, 50 7th Street NE., Atlanta 5, Ga., or PURCHASED from United World Films, Inc., 1445 Park Avenue, New York 29, N. Y.

Pertussis in Florida

ROBERT M. THORNER, M.P.H., and JAMES O. BOND, M.D.

PERTUSSIS killed more children than poliomyelitis in Florida in 1955, and three times as many cases of pertussis as of poliomyelitis were reported to the Florida State Board of Health. While remarkable advances have been made in the control of whooping cough, the disease continues to remind us that it is neither friendly nor familiar as we so often assume.

Physicians in private practice and public health have carried out an intensive campaign against pertussis in the past decade. Their major weapons have been active immunization with pertussis vaccine and antibiotic therapy of the clinical disease. Vaccine has been given to increasingly greater proportions of the child population since it was first introduced for general use in 1944. The antibiotic therapy of pertussis has been less effective than immunization in eradicating infection with *Haemophilus pertussis* itself (*1*, *2*). However, the control of intercurrent infections has undoubtedly aided in preventing deaths and shortening periods of communicability. These efforts are to be equated with the results obtained from a review of the morbidity and mortality statistics on whooping cough accumulated by the Florida State Board of Health over a period of almost 40 years.

Time Trends in Whooping Cough

The trend of reported whooping cough case rates for the entire history of case reporting in Florida is presented in table 1 and the chart. Whooping cough has been considerably underreported at all times. Though it is possible that reporting has improved some during the period covered, the extent of any such improvement is unknown. It is certain that the case rates understate the magnitude of the pertussis problem, but they are undoubtedly a valid indication of the trend of the disease.

Over the years there is considerable fluctuation of the rates, with epidemics occurring at intervals of 4 to 6 years, but 2 distinct almost level trends are distinguishable. One extends from 1918 to 1948, with a mean annual rate of 38.7 per 100,000 population. The other extends from 1948 to 1955, with a mean annual rate of 16.8 or a decline of 56.6 percent. This drop may be the result of treatment of the disease in the early stages with antibiotics, resulting in control without diagnosis and reporting, or it may be related to the introduction and use of pertussis vaccine.

In contrast to the morbidity rates, the death rate from whooping cough shows a declining trend over the entire period from 1918 to 1955 (table 1). The reason for this in view of the unchanging case rate is not apparent. It does not appear to be related through time to the introduction of either new preventive or therapeutic techniques.

Infant Death Rate

Cases and deaths by age for the 5-year period 1951–55 are presented in tables 2 and 3. Of the reported cases with stated age for this period, 17.9 percent were in infants under 1 year of age (table 2). Among the fatalities, 73.5 percent were less than 1 year old (table 3). The deaths that occurred within the first year of

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life are, however, fairly evenly distributed by age in months with the exception of the neonatal period when no deaths were recorded.

It has been a general policy in Florida to begin the course of immunizing injections at 3 to 6 months of age. It is of interest to note that 36.7 percent of the deaths occurred in children under 6 months of age and 18.4 percent in those under 3 months of age.

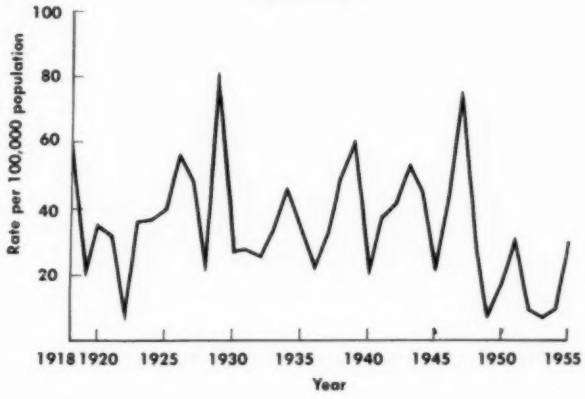
Although cases and deaths from whooping cough occur in both white and nonwhite persons, there is a definite concentration of the cases among the nonwhites (table 4). Over the 5-year period 1951–55 the rates for non-

Table 1. Reported cases and deaths from whooping cough, rates, and case fatality ratios, Florida, 1918–55

Year	Number of cases	Number of deaths	Rates per 100,000 population		Case fatality ratio [1]
			Cases	Deaths	
1918	557	151	59. 6	16. 1	27. 1
1919	203	51	21. 2	5. 3	25. 1
1920	347	64	34. 9	6. 4	18. 4
1921	333	68	32. 0	6. 5	20. 4
1922	94	30	8. 6	3. 1	31. 9
1923	410	71	36. 0	6. 2	17. 3
1924	444	111	37. 4	9. 3	25. 0
1925	493	66	39. 9	5. 3	13. 4
1926	748	55	58. 2	4. 3	7. 4
1927	654	67	49. 0	5. 0	10. 2
1928	321	43	23. 2	3. 1	13. 4
1929	1, 171	86	81. 8	6. 0	7. 3
1930	398	56	26. 9	3. 8	14. 1
1931	420	25	27. 9	1. 7	6. 0
1932	379	31	24. 8	2. 0	8. 2
1933	508	44	32. 7	2. 8	8. 7
1934	723	109	45. 6	6. 9	15. 1
1935	532	59	32. 8	3. 6	11. 1
1936	373	25	22. 2	1. 5	6. 7
1937	540	58	31. 1	3. 3	10. 7
1938	876	68	48. 9	3. 8	7. 8
1939	1, 124	60	60. 6	3. 2	5. 3
1940	383	39	20. 0	2. 0	10. 2
1941	747	36	37. 6	1. 8	4. 8
1942	828	47	40. 3	2. 3	5. 7
1943	1, 134	72	53. 3	3. 4	6. 3
1944	981	48	44. 7	2. 2	4. 9
1945	477	29	21. 0	1. 3	6. 1
1946	1, 029	12	43. 3	. 5	1. 2
1947	1, 861	30	74. 9	1. 2	1. 6
1948	731	21	28. 2	. 8	2. 9
1949	191	6	7. 1	. 2	3. 1
1950	471	8	16. 8	. 3	1. 7
1951	920	27	31. 7	. 9	2. 9
1952	291	5	9. 7	. 2	1. 7
1953	209	4	6. 7	. 1	1. 9
1954	339	1	9. 7	[2]	. 3
1955	1, 080	12	29. 6	. 3	1. 1

[1] Deaths per 100 cases.
[2] Rate less than 0.1.

Reported case rates of whooping cough, Florida, 1918–55



white persons averaged 22.3 compared with 17.0 for white persons. The mortality rate for nonwhites was 1.2 per 100,000 compared with 0.1 for whites, or 12 times as great. This difference is statistically significant at the 5 percent level.

The Epidemic Year 1955

In 1955, Florida experienced a sharp rise in the incidence of whooping cough (see chart). This increase was not wholly unexpected since, as has been previously noted, such peaks of incidence have tended to occur at intervals of 4 to 6 years. Nevertheless, a special surveillance of whooping cough cases and deaths was carried out to discover if the rise was due to true whooping cough and to elicit information which might aid in the prevention of future epidemics.

An epidemiological investigation was attempted for each of the 13 deaths occurring in 1955 and reported as due to whooping cough. Final evaluation of the information obtained verified that 9 of these deaths were due to whooping cough; 1 was definitely not whooping cough; and in the remaining 3 the information was insufficient to warrant any conclusions.

Of the 12 definite or probable whooping cough deaths, 11 were in Negroes and 1 in a white child. Eight were under 1 year of age, and 6 of these were 6 months of age or younger. There was a disturbingly consistent clinical pattern in the nine cases with reasonably complete information. The usual onset was insidious and did not arouse the concern of parents or physician, if the latter was consulted. There followed 2 or 3 weeks of progressively more severe coughing, accompanied by unsuccessful attempts to treat with home remedies or refills of original prescriptions. Characteristic, severe paroxysmal coughing with exsufflation of air and inspiratory whoop was often not present until the final week of the illness. The child usually appeared for medical attention either in extremis or with irreversible damage from anoxia and dehydration. Of the 5 patients taken to hospitals, 4 died within 48 hours of admission, and 1 died en route. In only 3 of the patients were X-rays taken; 3 had routine blood counts at some time during their illness, and in none were cultures of the nose and throat obtained.

The equivocal beneficial effect of antibiotic therapy of pertussis was emphasized by the list of seven antibiotics received by these children as a group. In only one child was pertussis hyperimmune serum used for therapy. It would be inaccurate, however, to describe these as treatment failures, since in no case did the physician have the opportunity to institute

Table 2. Reported cases of whooping cough, by age in years, Florida, 1951–55

Year	All ages	Under 1	1	2	3	4	5–9	10 and over	Age not stated
1951	920	137	79	92	96	74	335	85	22
1952	291	52	33	33	39	22	76	24	12
1953	209	41	32	25	17	8	66	16	4
1954	339	56	29	41	34	29	99	24	27
1955	1,080	201	127	103	88	84	292	131	54
Total	2,839	487	300	294	274	217	868	280	119
Cumulative percent [1]	100.0	17.9	28.9	39.7	49.8	57.8	89.7	100.0	

[1] Unknown ages excluded.

Table 3. Deaths from whooping cough, by age, Florida residents, 1951–55

Year	All ages	Under 28 days	28–59 days	Months										Over 1 year
				2	3	4	5	6	7	8	9	10	11	
1951	27		4	2	2	1	1	1	3	2	3	1		7
1952	5			1		1		1				1		1
1953	4				1					1		1		1
1954	1						1							
1955	12		1	1	1		1	2				2		4
Total	49		5	4	4	2	3	4	3	3	3	5		13
Cumulative percent	100.0	0	10.2	18.4	26.5	30.6	36.7	44.9	51.0	57.1	63.3	73.5	73.5	100.0

Table 4. Reported cases and deaths from whooping cough and rates, by race,[1] Florida, 1951–55

Year	Number of cases		Number of deaths		Rate per 100,000			
					Cases		Deaths	
	White	Nonwhite	White	Nonwhite	White	Nonwhite	White	Nonwhite
1951	663	244	6	21	29.0	39.5	0.3	3.4
1952	158	129	1	4	6.6	20.5	[2]	.6
1953	153	54	1	3	6.2	8.5	[2]	.5
1954	289	44	1		10.3	6.4	[2]	
1955	839	239	1	11	28.7	33.0	[2]	1.5
Average	420	142	2	8	17.0	22.3	0.1	1.2

[1] Cases with race unknown are excluded.
[2] Rate less than 0.1.

treatment after diagnosis in the early stages of the disease.

Typical case histories, supplied by Dr. James Stem, Dr. B. M. McKlosky, and Dr. Felix Balmir, follow:

CASE 1: N. W., a 16-month-old white female infant, was 1 of 6 siblings. The public health nurse had been in frequent contact with the family, but their religious beliefs had prevented immunization. Twenty-three days prior to death, the child developed a mild upper respiratory disease. Although typical cases of whooping cough were present in the older siblings, medical attention for the child was not obtained until 3 days prior to death. Severe paroxysm with typical whoop had been present for 5 days, and on the day of admission to the hospital, the child had been in a continuous convulsion for 4 hours with a temperature of 105° F. The total white cell count on admission was 21,000 with 71 percent lymphocytes. The hemoglobin was 11.8 grams. Despite administration of chloramphenicol and penicillin intramuscularly, adrenal cortical extract intravenously, continuous oxygen, and standard anticonvulsant therapy, the child remained comatose and died on the second day in the hospital.

CASE 2: E. C., a 1-month-old Negro female infant, became ill 14 days before death. Two other siblings in the home were apparently well. The mother did not recall having had whooping cough in her childhood. The initial symptoms were infrequent spells of coughing associated with collection of mucus. On the 3d and 10th day of the illness, a physician saw the child and prescribed Achromycin (tetracycline). Four days before death, the coughing became paroxysmal. The child became febrile and developed respiratory distress. While nursing on the final day of life, the child was seized by a paroxysm of coughing and died.

CASE 3: E. M. C., a 10-month-old Negro female infant, had onset of a mild respiratory illness 14 days before death. No family or neighborhood contact had whooping cough. At age 5 months she had visited the local health department clinic for immunization, but the parents were told to return her

at 6 months of age for her initial immunization. In the second week of her illness she developed typical coughing with inspiratory whoop, having 12 to 20 paroxysms per day. These were said to be accompanied frequently by convulsive episodes. On the 13th day of her illness, she was admitted to the hospital. Temperature on admission was 105° F. The white cell blood count was 22,850 with 67 percent lymphocytes. A chest X-ray revealed findings consistent with a diagnosis of interstitial pneumonia. She received intramuscular penicillin, streptomycin, and 2.5 cc. of pertussis hyperimmune serum. Despite heroic therapeutic measures, she died on the second day in the hospital.

Discussion

The first case represents the frustration of the best of medical and public health facilities by the lack of intelligent interest on the part of parents. The second case presents a typical problem in diagnosing a small infant. Pneumonia, perhaps due to aspiration, was the initial diagnostic impression, but in retrospect an underlying infection with *H. pertussis* was considered the most likely cause of death. It is a moot question whether, if this were the actual cause and it had been diagnosed, treatment would have altered the outcome of the case. Case 3 illustrates the need for beginning pertussis immunization at an earlier age than 6 months. In only 2 of the 12 cases was there a record of any prior pertussis immunization, and these were single diphtheria-pertussis-tetanus injections. In one case the health department notice reminding the parents of the need for immunization arrived the day after the death of the child. In two instances the parents refused immunization, in one they were unaware of the need, and in four cases immunization was deferred until the infant reached an older age.

It is generally agreed that immunization is the major weapon against whooping cough, and it would appear that in Florida it needs more vigorous use. The cyclical occurrence of the disease indicates a periodic buildup of susceptibles due to new births, although immigration cannot be ignored as a possible contributory factor in Florida. Particular interest needs to be centered on giving complete immunization to the group of children under 6 months of age. The American Academy of Pediatrics (*3*) recommends beginning pertussis immunization whether alone or in combination with diphtheria and tetanus between the second and fourth months of life. It has been shown that infants of this age are capable of producing agglutination antibodies against pertussis, although the response is quantitatively not as good as that against diphtheria and tetanus toxoids (*4, 5*).

There is a need in Florida for extending the immunization of Negro infants, a challenge of particular urgency for public health physicians. Private physicians should continue to stress the importance of immunizations as a part of the routine of infant care. It would appear important also to consider possible whooping cough in all protracted upper respiratory illnesses of infants with or without the typical inspiratory whoop. Parent education on the importance of routine medical attention for young infants is the job of all who are concerned about the future health and welfare of our children.

Conclusions and Summary

Whooping cough remains a major cause of death in infants in the communicable disease category. In Florida a reduction of the case rate by 56 percent during the period 1948–55 would seem to be related in time to the introduction and use of pertussis vaccine and antibiotic therapy. Modesty is appropriate, however, in assessing these therapeutic efforts since the steadily declining mortality rates are unrelated in time to specific preventive or therapeutic measures.

The epidemic year 1955 is ascribed to inadequate immunization of young children, particularly those under 6 months of age.

Routine pertussis immunization of infants beginning at the second month of life is necessary for complete control of this disease.

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publications

Special Health Services

PHS Publication No. 530. 1957. 19 pages; illustrated.

Activities concerned with accident prevention, air pollution, chronic disease, the aged, heart disease, occupational health, radiations, and tuberculosis are described in popular language, with glimpses of the work of the Division of Special Health Services of the Bureau of State Services, Public Health Service.

Tuberculosis Chart Series 1957

PHS Publication No. 534. 1957. 45 pages; charts.

This edition charts comprehensively the statistical aspects of the tuberculosis problem in the United States. The facts and figures, derived from many authoritative sources, cover a wide range of problems and challenges and are designed to provide a sound basis for program planning. Some of the subjects included are: estimated prevalence of cases; major types of expenditures, 1952 and 1956; newly reported cases and deaths, 1930–56; age-specific rates for newly reported active cases and deaths, 1955; race and sex of fatalities and newly reported active cases, 1955; and newly reported active cases per 100,000 population, United States and Territories, 1956.

Many of the charts, published formerly in the chart series, are reprinted because of their continuing pertinency and interest. Additional charts will be published in subsequent editions as new problems arise and changing trends demand.

Proceedings, 1956 Annual Conferences

Surgeon General, Public Health Service, and Chief, Children's Bureau with State and Territorial health officials

PHS Publication No. 522. 1957. 54 pages.

The proceedings contain the deliberations of the 1956 conferences of the Surgeon General with State and Territorial health officials, hospital and medical facilities survey and construction authorities, and mental health authorities. Addresses made to each of these groups are part of the publication.

Recommendations and resolutions of the participating State and Territorial officials reflect the attention given to such subjects as chronic illness and aging and standards for hospital and nursing home care; reporting of vital records and statistical data; accidents, labeling laws and regulations, and poison information centers; civil defense, radiological defense, and other emergency measures; curriculums for professional schools, training of dental and other public health personnel, and training of mental health personnel for community services; water and air pollution, Indian health, migratory labor, and other public health problems.

VD Fact Sheet

PHS Publication No. 341. Issue No. 13. 1956. 22 pages; tables.

Intended as a ready source of basic statistics on the venereal diseases in the United States, this publication presents data on trends in venereal disease incidence and prevalence. Other statistics relate to the estimated annual costs of uncontrolled syphilis, mortality and insanity due to syphilis, reported cases of venereal diseases, case-finding activities, morbidity by age, congenital syphilis, and use of penicillin in treatment of syphilis.

The information, current as of December 1956, supersedes previously published data.

This section carries announcements of all new Public Health Service publications and of selected new publications on health topics prepared by other Federal Government agencies.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications issued by other agencies.

Three Phase Sanitation Program in the Klamath Flood Disaster

JOE CREISLER, M.P.H., R.S.

OF the many activities carried on by the sanitation staff of a health jurisdiction, none can so strain the personnel, facilities, and general program as that required by a major disaster. Beginning in December 1955, the Humboldt-Del Norte County Health Department dealt with the special sanitation problems left by the flood of the lower Klamath River in Del Norte County, Calif. The sanitation program following the disaster operated in three phases: emergency, removal of flood debris, and rehabilitation. The objectives were to prevent the outbreak of any major epidemic, to protect the public health and safety, and to return the affected areas to normal as soon as possible.

The flood disaster occurred at the mouth of the Klamath River where the communities of Klamath, Terwer Valley, and Klamath Glen are located on the extreme flood plain. There the runoff of a watershed comprising more than 15,500 square miles empties into the Pacific Ocean.

The lower Klamath River was subject to the greatest flooding in the history of its recorded stream flow during the week preceding Christmas of 1955. The previous record peak flow at Klamath was 297,000 second-feet with a gauge height reading of 43.7 feet in January 1953. On December 22, 1955, the peak flow at Klamath was 400,000 second-feet with a gauge height of 49.7 feet (*1*). From December 19 to 25, the total volume of flow past the town of Klamath was 2,500,000 acre-feet.

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The Del Norte County Civil Defense Office later reported that 700 families, or about 2,450 persons, had to abandon their homes for the first 24 hours following the flood peak (*2*). In the town of Klamath, 312 structures were destroyed or damaged; 212 were individual homes. In the Klamath Glen and Terwer Valley areas, more than 47 residences were lost or damaged. The flood caused an estimated damage of more than $3,500,000 to an area along the lower Klamath River covering approximately 8 square miles.

As the flood waters receded, the full extent of damage to sanitation and the corresponding threat to public health and safety began to emerge. The contaminated and silt-laden flood waters had swept foodstuffs, furniture, clothing, and parts of buildings into mountains of debris, clogging the streets and commercial establishments. Buildings were knocked off their foundations; some were ripped up and deposited on the roads. Collected in gaping holes, themselves a threat to public safety, were sewage effluent, organic wastes, and other debris. The community water systems in the area were crippled. Sewage disposal was brought to a virtual standstill. Natural drainage courses for the runoff of normal surface water were altered by heavy deposits of silt.

The Emergency

During the acute emergency, the sanitation staff of the bi-county health department worked under the direction of the civil defense medical officer for Del Norte County. When communications were again functioning between the disaster area and headquarters of the health de-

partment, the department undertook joint jurisdiction with the civil defense medical officer of emergency sanitation.

The first job was to check and supervise mass feeding centers, water supply points, food distribution centers, and general emergency sanitary facilities. City water and a sewer system were available to the mass care center in Crescent City. The other centers, which were close to Klamath and the flooded area, had to depend on individual wells and septic tanks for water and for sewage disposal. We maintained constant surveillance of the water used at these centers by frequent checks and sampling. Despite overcrowded and strained facilities, however, sanitation was maintained at a high level in the mass care centers, and no major epidemic occurred.

After the flood waters receded, the town of Klamath, which had suffered the worst flooding, was placed under quarantine in an attempt to prevent looting and distribution of contaminated foodstuffs. The three lower Klamath River communities were surveyed to ascertain the extent of damage and the needs of the devastated area.

The most obvious need was for removal of the huge piles and pockets of debris. It was equally obvious that emergency organization and outside aid would be required simply to remove the superficial debris from the area.

The postflood survey drew attention to the special problem presented by the gaping holes which pitted the ground in Klamath, Terwer Valley, and Klamath Glen. Some of these holes predated the flood, but many had been made by it. They ranged from 2 to 20 feet in depth and from 10 to 200 feet in length. Because of their depth, location, or contents, we recommended that they be filled.

The only means of sewage disposal in the lower Klamath River area is by individual septic tank or cesspool. Before the flood, existing facilities were known to be seriously substandard. A survey of the town of Klamath in June 1954 showed that of more than 121 systems found, only 13 percent were up to California public health standards (*3*); 38 percent were barely passable; and 49 percent were below standard and constituted a hazard to the public health. Other parts of the lower Klamath River area presented the same conditions to a lesser degree.

As a result of the flood, nearly all the individual sewage disposal systems in the town of Klamath and its immediate surroundings were ruptured, silted-in, or otherwise made inoperative. The Terwer Valley area suffered some sewage disposal trouble, and the systems in Klamath Glen were completely destroyed.

Chemical toilets were stationed throughout the affected areas for use until the septic tanks could be cleaned out and restored. By contract terms arranged through civil defense authorities, a private sanitation company supplied and maintained the toilets under health department supervision. Experience in this and an earlier flood (January 1953) has convinced the health department that chemical toilets, maintained by a private concern and supervised by department sanitation staff, are the best means of emergency sewage disposal in a disaster. We found construction of sanitary privies impracticable because of the maintenance required.

Provision of safe and potable water during the emergency was not a big problem. Fortunately, a number of watering points—wells and springs—in and near the disaster area were untouched by the flood waters. People were cautioned to boil or otherwise disinfect all water, and a program of testing and decontaminating individual wells was begun. We investigated and sampled all watering points which could be drawn upon as sources of public supply. At first people brought their own containers to the approved sources. Later on water was distributed by the local fire district's pump truck. Plans were made to send drinking water around to workers in the cleanup program via the Red Cross canteen truck and the Salvation Army mobile mess unit. There was enough safe, potable water to fill all individual and domestic needs without rationing.

Removal of Flood Debris

By authorizing the bi-county health department to supervise a program of flood debris removal and rehabilitation, the board of supervisors of Del Norte County officially recognized the county's responsibility for these postflood

Courtesy Del Norte Triplicate

Flood peak in Klamath on December 22, 1955.

activities. Funds for the program were made available to the county through Federal grants under Public Law 875 (81st Cong.), as a disaster relief measure. The sum of $103,600 of Federal funds was budgeted for the removal of flood debris, destruction of unsafe buildings, emergency garbage disposal, and other contingencies affecting public health and safety. Additional amounts of $75,576 for the filling of the holes and $1,000 for the cleaning of septic tanks were granted under Public Law 875.

Flood debris removal began on December 27, 1955, with the signing up and hiring of the cleanup and heavy equipment crews which were already at work in the area. All labor and equipment used for 3 days after the flood had been donated to the program.

Three working crews, each with a foreman, were organized to do general cleanup work, operate heavy equipment, and provide emergency garbage and rubbish collection. Two crews, one operating heavy equipment and one collecting garbage and rubbish, worked in and around the town of Klamath. A third crew performed all three functions in the Terwer Valley and Klamath Glen areas.

One great asset to the cleanup program was the availability of heavy equipment and operators from the local lumber mills and logging operations in the Klamath region. More than 20 pieces of equipment were used daily in the first 2 weeks; a smaller number sufficed for the remainder of the program. This equipment consisted of dump trucks, tractors and carryalls, a pickup crane, loaders, tow trucks, pickup trucks, and logging trucks. The machines were used to move buildings off the roads, remove debris, collect garbage, and salvage property.

Payment was on a force-account basis with the equipment and its operation rented at established rates per hour.

In the town of Klamath, flood debris removal was first concentrated in the commercial section. Cleanup crews were at once put to work removing debris, rubbish, and flood-damaged foodstuffs from the restaurants, grocery stores, and taverns. Immediate attention to the food and drinking establishments was necessary to forestall a serious garbage problem, the illegal distribution of flood-damaged foodstuffs, and to prevent an infestation of rodents and insects.

Nonfood commercial establishments were then cleared of contaminated debris. We ordered that every business establishment where the public could encounter risk be cleaned. At the same time, the emergency garbage and rubbish collection crew was hauling garbage and flood debris to the public dump. Except in a few cases, private residences were cleaned by their owners. All possible speed was urged in this program, for we felt that only with rapid removal of the debris could an area where sanitation was so poor escape the outbreak of an epidemic.

The cleanup program included the destruction of flood-damaged buildings in and near the town of Klamath. Of the 68 parcels of occupied land in Klamath, structures on 18 had been wiped out by the flood. Under the cleanup program, damaged structures on 9 parcels were removed with the owner's written consent, and 1 or 2 damaged housing units were removed from 3 parcels of land on which other housing units remained intact.

In the second stage of the program the working crews were employed in a wooded area adjacent to and down river from the town of Klamath where flood debris of all kinds had drifted and lodged. To forestall a serious infestation of rodents and insects and to prevent use of damaged building material for possible substandard housing, the area was cleared and burned.

The cleanup effort began in the Terwer Valley and Klamath Glen areas after some delay due partly to a shortage of manpower and partly to the absence of many individual property owners who had been driven from their homes by the flood. However, no rubbish or flood debris was removed from individual property until the owner was able to salvage what he could. Dead animals, a serious problem in this area, were buried in one of the flood-made holes.

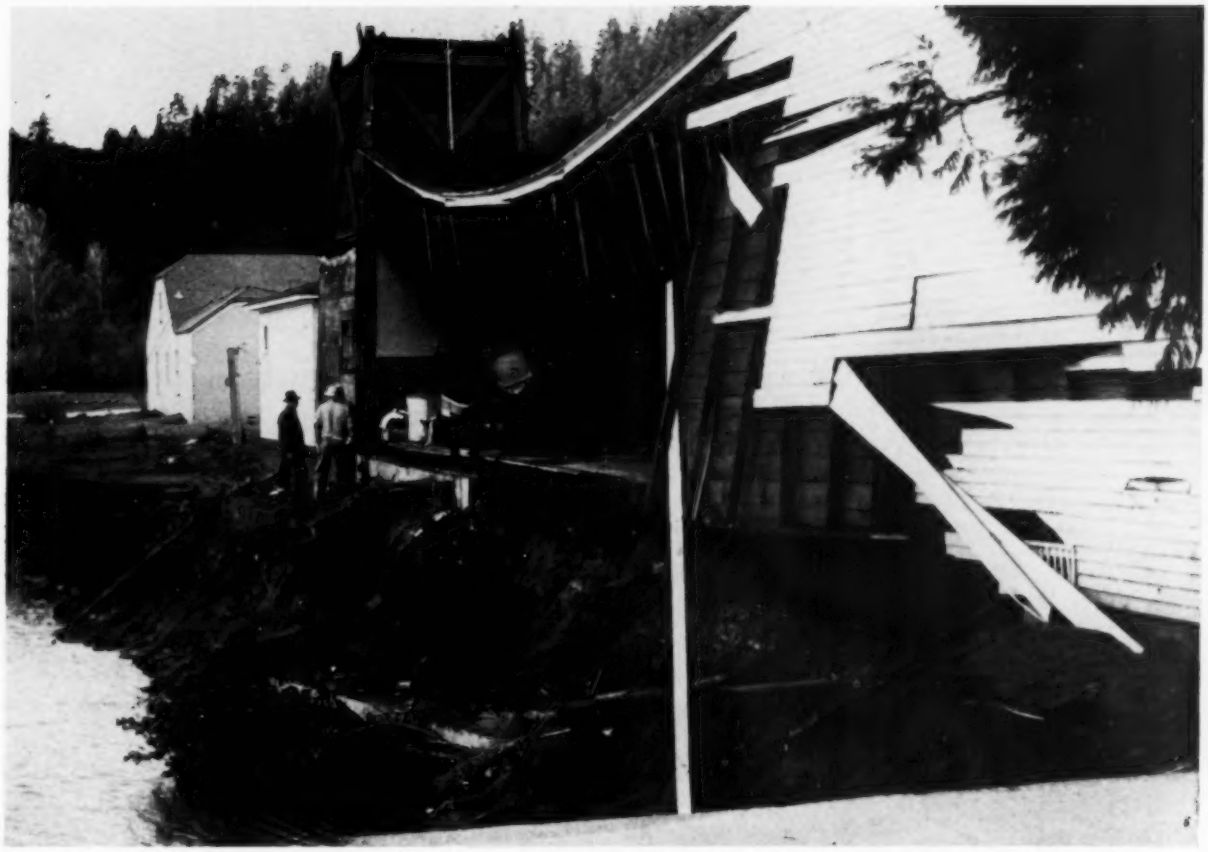
The health department also supervised the cleaning of those septic tanks and cesspools which had been so affected by the flood as to endanger public health. This project cost about $900 more than the $1,000 budgeted for it, but more than 234 loads were pumped from 54 individual systems by a special contract made with a local septic tank cleaning firm. Under this contract the local firm was paid $7.50 per load pumped, and the county paid for the gas and oil used. The usual cost per load of septic tank pumping is $17.50 for the Klamath area.

Rehabilitation

Rehabilitation following the disaster included the filling of holes; the correction of the acute drainage problem caused by the flood; restoration of the community water system in Terwer Valley and the attempt to rehabilitate the water system in Klamath; the supervision of the rebuilding of sanitary facilities; and the emergency housing program.

Filling the holes became the most controversial project of the entire postflood program. After the county board of supervisors ordered that the holes designated by the health department be filled, the California State Office of Civil Defense was to award the work contract to the State Division of Highways. However, the board of supervisors was informed that this job would be a county responsibility. In order to expedite the request for funds under Public Law 875 and prepare the necessary paperwork for the task, a cursory survey was made of the holes in the town of Klamath only, and estimates were obtained as to the amount of fill needed and the cost of the material. The job of filling the holes in the town of Klamath was given to a local contractor (without bids) at the rate of $0.95 per cubic yard, for 51,000 cubic yards of fill.

Immediately after the hole-filling project was started, two protests were made: first, that the fill material was too costly; second, that this program would raise the value of some private property above its preflood worth. The



Flood-made hole and projecting sidewalk where house once stood in Klamath.

health department advised the board of supervisors that the holes had to be filled because of the extreme hazard they presented, whether or not they had been there before the flood. The department's position was supported by the chief of the bureau of sanitary engineering of the State health department and by the director of civil defense of Los Angeles County on loan to Del Norte County. In order to eliminate the hazard as soon as possible, the board of supervisors awarded the contract and disregarded the property improvement argument.

More than 41 parcels of land in the urban sections of the disaster area were filled. In the town of Klamath, 5 major holes covering 19 parcels of property occupied before the flood were filled under the contract. Three other holes in Klamath, 8 parcels of land in Terwer Valley, and 12 parcels of land in the Klamath Glen area were filled using the force-account arrangement.

The silting in of natural drainage courses by the flood had changed and blocked surface water drainage in the vicinity of the town of Klamath. This condition caused local flooding covering several blocks in the town and affected the rehabilitation of those individual sewage disposal systems which still existed after the flood. Heavy equipment was used to fill minor depressions, level off irregular ground, and open up new drainage channels. The county road department helped with the problem.

Efforts to rehabilitate the area's two community water systems—one in the town of Klamath and the other in Terwer Valley—received support and technical assistance from the State health department. Restoration of the Terwer Valley system was accomplished right after the flood with minor repairs to the distribution lines and decontamination of the well supply. On the other hand, trying to get the Klamath water system rehabilitated was the most frustrating task on the postdisaster program.

Before the flood, equipment, operation, and maintenance by the private water company serving Klamath were below standard for a community water system. The system was severely damaged by the flood, and yet, despite constant urging by State and local agencies, no major repairs were undertaken by the company until after May 1956. That was 5 months after the flood.

But as soon as the cleanup program began in late December 1955, we needed water under pressure for washing down the commercial establishments and houses that were encrusted with flood-deposited silt. After the main lines were patched up, the Klamath water system was able to furnish water for cleanup activities such as "wash down."

The water could not be declared safe for domestic use, however. There were major leaks which could allow surface water to backflow into the system, and there were broken mains.

In circumstances like these, disinfecting the water provides some measure of safety. An emergency hypochlorinator was borrowed from the State office of civil defense, installed in the system, and turned over to the water company for operation. As it turned out, the hypochlorinator was used off and on for a while, and then it lay idle even though both State and local health personnel continued to urge its use.

The sanitation staff could not take over maintenance of the hypochlorinator, for we had neither time of our own to spare nor another qualified man available. From this experience we learned a very important lesson in disaster sanitation: emergency civil defense equipment, no matter how modern nor how needed, is useless if trained personnel are not on hand to use it properly.

In the case of the Klamath water system, the health department was caught in a dilemma. The purity of the water being supplied by the water company was questionable; the department had no legal power to insist that the company use the emergency disinfecting equipment or else undertake rehabilitation immediately; and the water was needed for important cleanup activities.

A backward look at the various postflood water problems shows that the sanitation staff

Courtesy Harris Studio

A flood-damaged building is burned in the cleanup program.

was able to handle emergency needs and problems of simple reconstruction. We failed to bring about the major rehabilitation of a community water system which its private owners, for financial or other reasons, would not undertake on their own. An important cause for this failure was the absence of any legal authority which would have enabled the county or the State to step in.

The rebuilding of sanitary facilities, buildings, and emergency housing was a joint venture of Del Norte County and the State division of housiny. The division of housinf performed most of the work under the authority of an emergency county building permit ordinance. The health department inspected emergency housing units (trailers) for general sanitation.

Special Problems

The flood debris removal probram presented some special administrative and health problems not anticipated as part of the postdisaster planning. As the disaster relief program progressed, it became apparent that on rigid administrative policies could be set and maintained. Instead a fluid, or command decision,

approach was required of the health department and the county.

One of the main problems was to set up emergency payrolls for the cleanup crews and rental fees for the heavy equipment used. Del Norte County was fortunate in having a county auditor who was able to grasp quickly the financial intricacies of Public Law 875 and to set up the accounting methods and books necessary for the functioning of the program.

The difficulty arose in signing up a fluid working force and hiring heavy transit equipment, both of which were already working in the disaster area, and in organizing an emergency payroll. In the beginning, a bewildered timekeeper listed the name of the worker or the owner of the equipment and the hours spent on cleanup work on slips of paper and hastily bought timebooks. Initially the loose-knit organization and supervision of the crews caused such confusion in timekeeping and the placing of workers that supplemental payrolls were required to set things straight. This situation was remedied when rates of pay and rental fees for equipment were established, crews properly hired and supervised, and social security numbers and withholding tax categories obtained.

A hindsight look at this problem of emergency payrolls for disaster work shows the need for having an emergency payroll and proper administrative procedures set up as part of civil defense planning. We will not soon forget the nightmare, just after the disaster, of organizing a payroll for people dependent upon the paycheck to feed and clothe their families.

A serious health problem arose during the cleanup program concerning the illegal distribution of quarantined foodstuffs. The health department had posted and placed all food establishments and taverns under quarantine immediately after the flood, but adequate manpower was not available for enforcement. Foodstuffs were looted and picked up in the flooded area. Efforts by Federal, State, and local food inspectors to survey for condemnation or release of foodstuffs did little to stop the practice. We faced the same problem at the county dump, which was the designated place for the dumping of flood debris. Although the dump was posted with warnings against taking condemned foodstuffs, people continued to raid it. In spite of this illegal distribution of foodstuffs, no reported cases of serious food poisoning came to the attention of the health department.

An additional public health hazard came from the contaminated silt which settled throughout the town as an aftermath of the flood. Our first plans were to make silt removal the responsibility of the private property owner. Soon it became apparent that the foul smelling silt, mixed with organic waste material and sewage effluent, was too much for individual owners to cope with; they were only moving the contaminated silt—and the hazard—from one place to another. In order to get it done properly, the county undertook silt removal.

We used heavy equipment to scrape and remove the contaminated silt from private property to the county roads. From there it was picked up by truck and hauled away to be used as fill in the deeper holes being filled as part of the general program. In places where heavy equipment could not be used, the silt was spread out for leaching by the rains or disinfection by sunlight and the use of "hot" lime. These areas were posted with warning signs which read "Warning—Raw Sewage in this Area."

One special assignment to the health department was the disposal of lost property picked up by the cleanup crew. Such property was stored in open depots and the one available warehouse in the Klamath area. The material was then inventoried and the list published in a local paper for a period of 90 days. All the property not claimed at the end of this period was sold for the county under the supervision of the health department. Very little property was claimed, and the expenses of collection, transportation, inventorying, and publishing amounted to about $400. The amount collected by the county from the sale was about $70. This was one task we had certainly not anticipated as part of emergency sanitation work.

Analysis

The entire postflood disaster program, which included flood-debris removal, cleaning of septic tanks, filling of holes, and general emergency

sanitation work, covered a period of 16 weeks, December 27, 1955, to April 14, 1956. Most of the flood debris was removed in the first 7 weeks, with an average daily working force of 130 for the first 2 weeks, decreasing to an average daily crew of 24 for the seventh week and the use of 1 or 2 men for the remainder of the period. The hole-filling program was completed in the 16th week after the flood. Because of the extreme urgency for cleaning up the disaster areas and the possibility of losing the labor force with the reopening of local industries, large crews were used except in the Klamath Glen area. In spite of adverse weather, most of the town of Klamath and partial sections of Terwer Valley and Klamath Glen were cleaned up by the seventh week after the flood.

A review of the program shows that the department accomplished the cleanup in what could be considered record time, prevented the possible outbreak of a major epidemic, and improved the environmental sanitation of the disaster area. The county and the health department attempted to return the affected areas to a state of normalcy, the primary aim of all postdisaster activity. The objectives of the health department were accomplished through the teamwork of Federal, State, and county government officials on the one hand and the citizens on the other.

The long-range rehabilitation problems of proper sewage disposal, adequate and safe water supply, and some measure of flood control face the people of the Klamath area. The health department, in conjunction with other county agencies, has been delegated to help work on these problems. Through continued cooperation and teamwork between county, State, and Federal agencies, in time full rehabilitation can be effected.

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(2) Del Norte County Civil Defense Office: Report on flood of December 21, 1955. Crescent City, Calif., 1956.

(3) California Department of Public Health: Septic tank systems for private homes. Berkeley, 1953.

Biology of Water Supplies

Three training courses in water pollution control are scheduled by the Robert A. Taft Sanitary Engineering Center for the fall of 1957. Training in the biology of polluted waters is offered October 7 to 11; the bioassay of toxic wastes, October 14 and 15; and advanced training in detection and control of algae and other interference organisms, November 4 to 8.

Courses are open to personnel in industry, in State, county, and municipal health departments, in water supply and pollution agencies, colleges, universities, and research organizations.

Address requests for further information to the Robert A. Taft Sanitary Engineering Center, Public Health Service, 4676 Columbia Parkway, Cincinnati 26, Ohio.

Rehabilitation

WITH the cooperation of Miss Mary E. Switzer, director of the Office of Vocational Rehabilitation, Department of Health, Education, and Welfare, *Public Health Reports* has obtained a number of contributions relating rehabilitation work to public health. We hope these papers will assist health agencies in creating or restoring in many crippled, bedridden, or otherwise handicapped patients a greater degree of self-reliance and usefulness.

Rehabilitation services are at every point a logical expression of a positive philosophy of public health, seeking not merely to prevent or attend disaster but to create a state of well-being.

With respect to certain categories of disability, our contributors were asked to set down information which might improve comprehension of rehabilitation opportunities. They have endeavored in most of these papers to describe the nature of the disability, remedial potentials, methods, typical complications, and reasonable goals. Since more papers were offered than could be scheduled in one issue of this journal, publication of several has been deferred.

If readers are interested in learning more about case finding, home care, or community facilities for rehabilitation, we shall try to provide such information in future papers.

In addition to completing this roundup of disability categories in rehabilitation, we hope that future contributors will report successful efforts to utilize ordinary health department resources to find and assist candidates for rehabilitation, in cordial cooperation with established welfare services, rehabilitation agencies, and allied community facilities.

Rehabilitation

A Guide for Referral Agencies

E. B. WHITTEN

IN a certain county, not too long ago, a State rehabilitation supervisor was describing the services of his office to a public health worker, who interrupted to say, "This is wonderful. When are you going to begin the program in this county?" The counselor, who had served this part of the State for several years, was naturally disconcerted that his program was so little known. The public health worker should have been equally embarrassed that she did not know about this source of help for handicapped people.

My own experience has taught me that one can never take for granted that others understand the uses they may make of his program. Full understanding does not come about until workers of different agencies have actually worked together in providing services. There seems to be no effective substitute for learning by doing.

Vocational Rehabilitation Service

Rehabilitation agencies have legal responsibility for providing rehabilitation services to adults with physical or mental disabilities that handicap employment. Every State has a vocational rehabilitation service; in most instances, it is administered by the State board of vocational education or the State department of education. Exceptions are Massachusetts, South Carolina, New Jersey, and the District of Columbia, where independent rehabilitation agencies have been established. It should be noted that rehabilitation programs for the blind are more often administered in State departments of public welfare or independent commissions for the blind. Vocational rehabilitation offices are found in all principal cities, and itinerant services are sometimes available in other areas.

Rehabilitation services in these agencies include diagnostic services (medical, social, psychological); medical treatment, including surgery, hospitalization, and medically supervised therapy; prosthesis; vocational training; placement services, including occupational tools and equipment; and job adjustment services. Maintenance may also be provided to assure the availability of other services. A means test is required for all except diagnostic services, counseling and guidance, vocational training, and placement. This test is generally much more liberal than that applied by State agencies to determine eligibility for public assistance.

Referral agencies should direct all handicapped adults to the vocational rehabilitation service, unless they are clearly ineligible. Rehabilitation agencies serve individuals with all types of disabilities and are in position to purchase the very best diagnostic and treatment services available. The personnel of these agencies are intimately acquainted with all community resources that can be mobilized to help handicapped people solve their problems.

Limitations may be encountered. Vocational rehabilitation agencies can accept only those handicapped for whom there is a "reasonable expectation of remunerative employment," and only those individuals that are of, or near, work age. The referral agency should allow the rehabilitation agency to determine whether a particular individual can be given vocational

Mr. Whitten is executive director of the National Rehabilitation Association, Washington, D. C.

rehabilitation rather than attempt to decide this itself. Incidentally, State rehabilitation agencies have been expanding rapidly during the last few years, the national total of financial support having doubled in 3 years. This expansion has not been uniform throughout the Nation, but in most States the vocational rehabilitation agency is probably better prepared to serve the handicapped than ever before.

Crippled Children's Service

The State crippled children's service is legally responsible for serving handicapped children, as the vocational rehabilitation service is for adults. Crippled children's services are, however, traditionally limited to certain categories of the handicapped, and the degree of coverage varies widely among the States. Children with orthopedic and plastic disabilities are served everywhere. Some States have programs for victims of rheumatic heart disease, cerebral palsy, and other disabling conditions. Crippled children's services are usually administered in State departments of public health, although in some States, departments of education and departments of public welfare are in control. Incidentally, the fact that the crippled children's service is administered by the public health department does not necessarily mean that public health employees in other divisions of the department have a thorough understanding of its services. Some people know more of what is going on in the next State than they do of what is going on in the next office.

In most of the States, crippled children's services are largely medical. Much of the medical service of crippled children's agencies is provided in outpatient diagnostic and treatment clinics. The specialized hospital is also widely used.

There is a growing tendency to provide educational services for crippled children, if they are supplied at all, in the regular public schools, and they are sometimes given by special schools for certain classes of handicapped children. Information about the local program for handicapped children and its coordination with medical services should be available from the school board. Many States now appropriate funds to help local school districts develop and operate special classes for handicapped children. Your local superintendent of schools will know whether such aid is available in your State.

Assistance and Insurance

Health workers should also be familiar with assistance and insurance programs for handicapped people. Nearly all States have public assistance agencies for the "permanently and totally disabled." Generally, these agencies work closely with vocational rehabilitation agencies. It is realized by everyone that it is far better, both for the handicapped individual and the Nation, that the individual rehabilitate himself than become a permanent recipient of public assistance.

Many handicapped persons have rights under the Federal old-age and survivors insurance program. A person 50 years of age, for instance, who has acquired social security credit for 5 years of work in the 10 years before onset of his disability, and who worked 1½ years in the 3 years before becoming disabled, may receive cash disability benefits if he is so severely disabled that he is unable to engage in any substantial gainful employment. If he is less than 50, he can have his earnings record frozen so that benefits he is entitled to at age 50, or on retirement at age 65, will not be reduced on account of loss of work credit due to his disability. Children, disabled before reaching age 18, of insured parents deceased after 1939 or receiving old-age insurance benefits, are also eligible for cash payments. Application should be made to the local offices of the Bureau of Old-Age and Survivors Insurance. In a vast majority of the States, the actual determination of disability is made by the vocational rehabilitation agency.

In every State employment service office, at least one employee gives special placement services to the handicapped. Unfortunately, these services are not uniformly effective throughout the country. The vocational rehabilitation service to which the handicapped person is referred provides rehabilitation services and works with the employment service when the individual is ready for a job.

Other Facilities

In almost every medium-sized or large city additional facilities and services are available to handicapped persons. These are as varied as the communities themselves and are likely to be products of voluntary effort. They may be sponsored by local units of national health agencies such as the National Society for Crippled Children and Adults and the American Hearing Society, or they may be independent, nonprofit, community undertakings. Prominent among such facilities, and rapidly increasing in numbers, are rehabilitation centers and sheltered workshops.

Fortunate is the community that has a well-organized and effective rehabilitation center and sheltered workshop facilities. The rehabilitation center attempts to bring together the skills of professional rehabilitation workers for their effective application. It may be a comprehensive facility, offering medical, psychological, social, and vocational services, or it may offer a narrower range of services. The physician, the counselor, the social worker, and therapists usually form the nucleus of this rehabilitation effort, which may be operated on an outpatient or inpatient basis, or both.

The sheltered workshop provides available employment opportunities for handicapped people who cannot fit into competitive employment or who cannot find jobs commensurate with their abilities. It may also provide a transitory adjustment service as a steppingstone to competitive employment. The current tendency is toward emphasis on transitional experience.

To a public health worker who wants to assist the handicapped, there is probably no better advice than "know your community." If he undertakes systematically to become acquainted with the rehabilitation programs of the community, he will feel rewarded for the experience.

New Treatment for Aged Disabled Veterans

A rehabilitation program has been developed by the Veterans Administration for aged disabled veterans. Many of the treated patients, including victims of strokes, hardening of the arteries, and multiple sclerosis, might otherwise be destined to spend the remainder of their lives in hospitals. Prior to treatment, some were not able to leave their beds unaided or propel themselves in wheelchairs. Others were too confused to move about the hospital alone.

After specific medical and surgical treatment, the patients are placed on special rehabilitation wards, and, under guidance of a specialist in physical medicine and rehabilitation, are given individually planned treatment. Physical and corrective therapists build the patients' strength and coordination with exercises and teach them to walk and to perform their daily activities. Patients who have lost use of their limbs are fitted with braces. Under supervision of an occupational therapist, the elderly veterans work in arts and crafts to improve performance and their ability to adjust emotionally.

At the Veterans Administration Hospital in Fort Howard, Md., 50 out of 60 aged patients receiving rehabilitation treatment were discharged, and at the VA Hospital in Minneapolis, Minn., 25 of a group of 130 left to begin work; 40 others were discharged to their homes, and all except 10 showed significant permanent improvement.

Rehabilitation

Community Plan for Epileptics

FRANK RISCH, Ph.D., and AUGUSTUS S. ROSE, M.D.

THE PROBLEMS in rehabilitation of persons with epilepsy differ in many respects from those encountered in dealing with physical handicaps of other types. For one thing, there is lack of unanimity within the medical profession concerning definition and diagnosis of the condition. For another, the public is considerably confused by much misinformation and little correct information. Despite present-day knowledge about epilepsy and the availability of good medical treatment, many people still think of the affliction as a "taint" and believe it to be associated with insanity.

Epilepsy, a condition in which there are recurrent episodes of disturbance in consciousness, varies in form and severity. Some spells are only momentary lapses, while others are severe generalized convulsions. The spells may be simple automatic movements or peculiar actions associated with unresponsiveness and a complete lack of memory. The seizures are manifestations of a brief disturbance in functioning of the brain, which very often is the result of an old, forgotten or unknown injury. One of the peculiarities of the handicap produced by epilepsy is that the person may be entirely normal in appearance, manner, and intellectual ability between seizures. The suddenness with which the attack comes and helplessness felt by those nearby add to the mystery of the condition.

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School authorities, employers, and fellow workers generally do not like to have an epileptic around. Children with epilepsy are commonly sent home from school after an attack, and frequently they are excluded from regular public school classes altogether. Ostracism and family feelings of shame, which may be present, make a bad situation worse. The young person who has a seizure while at work may lose the job, and a long hard road of having to lie about his condition is begun if any work at all is to be had. Capacity to work is not the measure. The adult who has supported his family finds after developing epilepsy that life can be very grim. Discrimination and enforced dependence lead to lack of confidence and often to increased difficulty in controlling the seizures.

Because of the large number of persons with epilepsy—it is estimated that there are now about one and one-half million in the United States—the Veterans Administration in 1949 appointed a medical committee to survey the problem among veterans in the Los Angeles area. This survey revealed that 75 percent of the veterans with epilepsy living in the community were unemployed and that a large percentage of this group were also under poor medical control. A number of veterans with epilepsy were in the hospital, and experience has shown that once in the hospital, epileptic patients tend to remain under the care of the Veterans Administration indefinitely.

In 1950 the Veterans Administration began a pilot study in employment of domiciled epileptic veterans. This study, in the form of an experimental workshop, was designed to determine the beneficial effects of steady, gainful employment on control of seizures, and to pro-

mote economic rehabilitation of the epileptic. In both these aspects the results have been more than encouraging. The shop operates through contracts with outside firms . . . operations simulate prevailing shop practices in private industry . . . employment is voluntary and placement is eagerly desired. The program has received the commendation of many who believe it to be modeled after the best medical and industrial traditions.

The success of this endeavor not only assured its continuation but also served as a stimulus for establishing a comparable workshop in the community for all persons, veterans and nonveterans, unemployed because of epilepsy. This shop, which began operation on January 16, 1956, is called Epi-Hab L.A. Inc. It is dedicated to the reintegration of the epileptic through medical control, industrial training, employment, and placement and is supported by grant funds from the Office of Vocational Rehabilitation, Department of Health, Education, and Welfare, matching private funds, and a variety of gratuitous services from the community. These services are in the fields of law, advertising, public relations, accounting, medicine, labor, industry, and engineering.

Drawing upon experience in the Veterans Administration workshop and, particularly, in the Epi-Hab project, we shall review specific aspects of the epilepsy problem in an industrial setting.

The Reject Syndrome

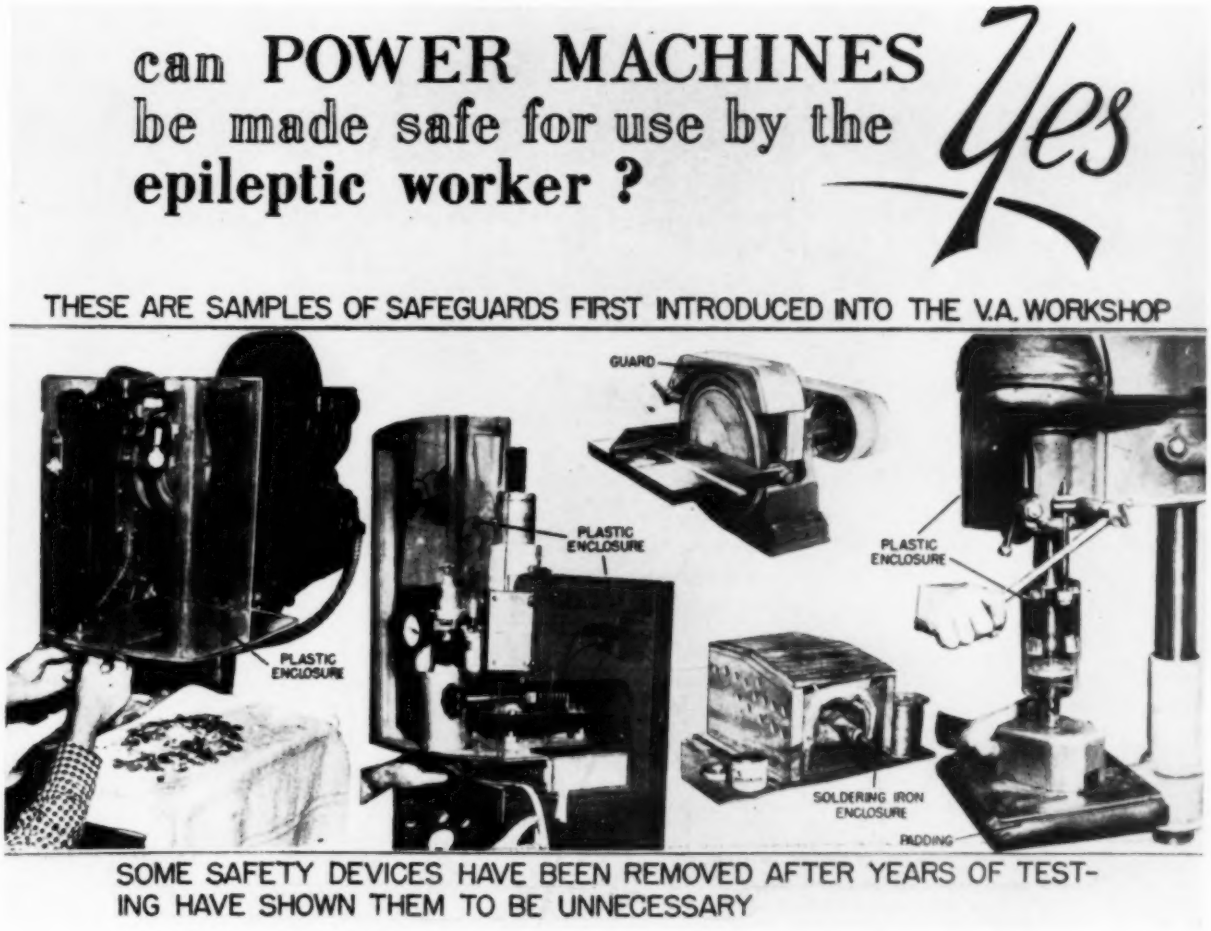
Not infrequently the individual with epilepsy denies his affliction and substitutes an entity which he describes as a dizzy spell, a blackout, a weak spell, or simply a peculiar feeling. He cannot accept epilepsy as a part of his life; the stigma is much too damaging to his self-esteem. Now and then he appears suspicious and reluctant to talk about his seizures. He is usually sensitive, defensive, and resentful, and sees himself as miscast in a competitive society.

The age of onset of the seizures is a most important factor in the development of this reject syndrome. Onset during infancy or early childhood, with continuation of the attacks for a number of years, tends to contribute significantly to the molding of the syndrome. Here one is dealing with incorporated parental fear, guilt, resentment, and concern, and the distorted attitudes of the community, which tend to structure and foster the reject syndrome. Occurrence during adolescence may interfere with growth toward independence, feelings of security, and ability to establish warm interpersonal relationships, but the damage is usually less severe than at younger ages. The effect of onset of epilepsy on the already well-formed behavior patterns of the adult may be slight.

A census study of some 100 epileptics residing in the domicilary unit of the Veterans Administration Center in Los Angeles found that approximately 64 percent of the group had not gone beyond grade school, 31 percent had never married, 49 percent of those who had married were divorced or separated, 89 percent had an unstable work history after onset of epilepsy, 5 years was the average length of hospitalization (with a range of 1 month to 24 years), and 84 percent of the group suffered from moderate to severe psychological incapacity. The instability factors in work, marriage, and emotional adjustment presuppose absence of motivation, presence of maximum dependency strivings, and desire for custodial care. Isolationism and social withdrawal signified by unwillingness to communicate with fellow patients, feelings of resentment, lack of appreciation, diminution of confidence, and a host of other maladaptive personality traits reinforced by lack of interest and drive were the telltale characteristics of this community.

Let us see what happened when these human rejects were placed in circumstances in which their activity was rewarded, that is, in gainful employment. In this situation some of their maladjustive tendencies should be counteracted through a demonstration of usefulness by means of forced interdependence in work assignments and through a demonstration that in their community others are envious of their status, especially those domiciled for disabilities other than epilepsy.

The realinement of behavior patterns and the changes in attitudes required considerable time, patience, and effort. The crucial test of altered sentiments came when a number of these people were forced into the position where they had to choose between (*a*) continu-


can POWER MACHINES be made safe for use by the epileptic worker ?
Yes
THESE ARE SAMPLES OF SAFEGUARDS FIRST INTRODUCED INTO THE V.A. WORKSHOP
GUARD
PLASTIC ENCLOSURE
PLASTIC ENCLOSURE
PLASTIC ENCLOSURE
SOLDERING IRON ENCLOSURE
PADDING
SOME SAFETY DEVICES HAVE BEEN REMOVED AFTER YEARS OF TESTING HAVE SHOWN THEM TO BE UNNECESSARY

Poster in an exhibit shown at professional meetings in 1955 and 1956.

ing their work and relinquishing their pension, the only form of security many of them had; and (*b*) giving up their work and continuing on their total non-service-connected pension.

Treatment of the rejection-and-dependency syndrome in the Veterans Administration industrial setting resulted in relinquishment of pension, the passive form of security, by 18 epileptic veterans. This voluntary surrender of the pension proves again that there are ways of motivating people, even those who belong to the hard core of unemployables, if status and self-esteem are substituted for dependency and rejection.

Limits of Job Placement

In assigning an epileptic to a job on machinery, consideration should always be given to the dangers of the machine and to the nature of his seizures. If seizures are nocturnal or if there are distinct warnings prior to a seizure, there is no need to be greatly concerned. If seizures are of the grand mal or psychomotor type, the most important factors, according to the experience at Epi-Hab, are the level of intelligence and the degree of emotional stability of the individual.

In the beginning of the Veterans Administration project, extraordinary precautions were taken for the safety of the employees. Projecting portions of machines were covered with foam rubber and other soft padding to prevent injury in the event of seizures. Transparent plastic was used freely to cover moving parts of the machines so that they would remain in full view. However, experience has shown that the unusual safeguards are no more effec-

tive against injury than the standard measures used by industry, and many of the experimental devices have therefore been removed.

Should the person with epilepsy work with machine tools which are ordinarily considered dangerous by industry, but which would raise his level of skills and thereby increase his potential for independence? Yes, of course, he can use most of them. A few—the lathe, the heavy hydraulic press, the heavy stamping machine, the milling machine, for example—have not been considered for use at Epi-Hab. Conservative thinking is still in order, for there are definite limitations to what the epileptic can do with safety. Where to draw the line, however, is a question that can perhaps best be answered through experience. Limitations pertain more to jobs performed at elevations or to those requiring exposure to open pits, large vats containing solvents, explosive materials, and moving equipment which can cause loss of life than to other types of jobs.

Seizures and Accidents

During the first year of Epi-Hab operations, 134 applicants were psychologically and socially screened for employment, and 57 were hired, 53 men and 4 women. Of the 57 hired, 16 were released for one of the following reasons: (*a*) left the State, (*b*) obtained a job closer home, (*c*) was absent excessively, (*d*) was uncooperative, (*e*) had serious personality problems. The capacity of the Epi-Hab plant is 50 employees. At the end of the first year, 41 employees were holding a variety of machine, subassembly, and electronic jobs, and 9 jobs were yet to be developed and filled.

The total number of man-hours worked at Epi-Hab was 42,221. During these hours there were 205 seizures; 194 were the grand mal type, the most disturbing kind in the employment situation, and 11 were of the Jacksonian or psychomotor variety. Time lost from work because of seizures amounted to 126 hours and 41 minutes, an average of 32 minutes, at a cost of 74 cents, for each seizure. Twenty-three of the 57 employees hired, or about 40 percent, experienced seizures while in the shop. Interestingly, 10 percent of the employees had 70 percent of the seizures, and one individual had 45 percent of the seizures. The employees having most of the seizures had the majority of their attacks during the first few weeks of their employment, a finding that supports the idea of progressive decrease in seizure frequency and intensity with passage of time and acquisition of confidence in the job. The policy of the shop is to return a man to his job soon after his seizure.

Accidents recorded during the first year numbered 27. These occurred to 18 of the 57 employees, or to 31 percent of the working population. The distribution of the accidents according to type and severity is as follows: 20 accidents not due to seizures in which first aid was given and the individual returned to work immediately; 1 accident not due to seizures in which medical treatment was required for severe thumb laceration, with some time being lost from work; 4 accidents due to seizures in which first aid was given and the individual returned to work immediately; 2 accidents due to seizures in which medical treatment was required for lacerations, with some time being lost from work. Only 3 of the accidents were reportable under workmen's compensation insurance.

From these figures, it can be concluded that the amount of time lost because of accidents was negligible. The workmen's compensation insurance carrier considered the accident rate in relation to the number of man-hours worked a noteworthy achievement and possibly lower than one would expect in the ordinary manufacturing plant.

Adjustment to the Job

Epileptic employees, of course, have associated emotional disturbances. It has been necessary on occasion to deal with problems arising out of the emotional conflicts of the employee rather than from the presence of dysrhythmic cortex.

The majority of Epi-Hab's employees have performed their duties energetically and economically, often to the envy of the industrial plant subcontracting work to the Epi-Hab plant. However, among the 57 hired during the first year, there were a few with deviate per-

sonality patterns of behavior resulting from a background of disruptive and traumatic experience. These people were just as maladjusted at Epi-Hab as they had been outside in the competitive industrial setting. They performed their work erratically, were unwilling to accept responsibility for adequate performance of a job, and would quit work without any apparent provocation. When they were placed on a job the performance of which fitted well their symbolic needs and defenses, however, there occurred a surprisingly marked improvement in job adjustment. Over a period of time these, as well as the other employees at Epi-Hab, began to show changes in attitude, changes which brought them closer to integration with co-workers, family, and society.

Summary

An industrial-medical plan, called Epi-Hab L.A. Inc., aimed at the conservation of human energy and restoration of respectability among those afflicted with epilepsy has been put into operation in Los Angeles. Medicine alone cannot counteract the stresses of life that play so important a role in precipitating seizures. Happiness gained through productivity, independence, and social acceptance is as essential to the well-being of the epileptic as it is to those who are not so afflicted.

Rising Income of Blind Vendors

During fiscal year 1956, gross sales at vending stands operated by blind persons rose by 10 percent to a record $25.8 million. Net annual incomes of the 1,804 blind operators averaged more than $2,500, an increase of about $187 over the previous year. In 1956, these operators and their 333 blind assistants earned an aggregate of more than $5 million, as compared with $4.5 million earned by 1,721 operators and their employees in 1955.

Under the Randolph-Sheppard Act, as amended in 1954, blind persons licensed through State agencies designated by the Office of Vocational Rehabilitation were authorized to operate vending stands on suitable Federal property and were given priority in setting up such businesses.

The majority of blind operators were trained by the State rehabilitation agencies under the State-Federal program. In addition to drawing up regulations for vending stand programs, the Office of Vocational Rehabilitation assists in educational efforts, surveys potential sites, and works with State agencies in developing, expanding, and improving their programs.

Rehabilitation

Hearing and Acoustical Handicaps

LeROY D. HEDGECOCK, Ph.D.

THE PROBLEMS attending the failure to hear normally can hardly be understood without some grasp of what normal hearing is like. This understanding must go beyond the physical characteristics of sound and beyond the organic reception of auditory stimuli. It must include an awareness of the psychological and social effects of audition. Apparently it is difficult to establish the concept that hearing may differ not only in degree but also in kind. Every clinician concerned with hearing is familiar with reports that a patient can hear "real well" and yet fails to understand much of what is said to him. Most of us know of persons who literally can hear a pin drop but still have difficulty in oral communication. Such instances, along with observation and study of persons with severe loss of hearing, point to the important fact that deafness brings about a qualitative as well as a quantitative change in the total pattern of sensory perception (*1*).

Sound Heard by the Normal Ear

A brief description of how we hear will illustrate some of the possibilities for difficulty in the function of hearing. Although its performance is taken for granted, the normal ear actually is one of Nature's most remarkable creations. Physicists tell us that the normal ear is capable of detecting changes as small as 1-billionth of the atmospheric pressure on the eardrum (*2*). For the convenience of avoiding the large numerical differences that would be involved if measurements were made in actual acoustic pressures, the measurement of sound intensity usually is expressed in logarithmic units known as bels and decibels. This system has no fixed quantity, but rather it expresses a ratio of two quantities such as double, triple, tenfold, and so on. On such a scale the intensity range of the normal ear for a 1,000-cycle tone is approximately 120 decibels. On most audiograms the zero-decibel level represents the intensity at which normal ears can just detect a tone. Loss of hearing then is expressed as so many decibels above that intensity.

The range of audible frequencies for normal human ears extends from approximately 20 to 20,000 cycles per second. It may orient our thinking to remember that the pitch of middle C on the musical scale is approximately 250 cycles per second. The range of frequencies that are important for conveying a speech signal is from about 300 to 3,000 cycles per second. The frequencies ordinarily measured by an audiometer are from 125 to 10,000 cycles per second.

The total number of pure tones that most ears can distinguish on the basis of both frequency and intensity is on the order of 340,000 (*3*). We know, of course, that most of the sounds we hear are not of a single frequency nor at a single intensity. Instead they are combinations of many frequencies and intensities that change almost continuously. The result is that the normal ear is responsive to a practically infinite variety of sound patterns. This is possible because of the highly specialized and delicate structure of the human ear.

Structure and Functioning of the Ear

For purposes of study and description, the ear may be divided into three parts: the outer ear,

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the middle ear, and the inner ear. The outer ear of man is not very complex. It consists simply of the visible auricle on the side of the head and the external auditory canal that forms an unobstructed passageway of air to the eardrum.

The middle ear is more complex, both structurally and functionally. It serves as a mechanical transducer of sound vibrations from the surrounding air to the fluid of the inner ear. The eardrum (tympanic membrane) separates the outer ear from the middle ear. Attached to this membrane and extending across the space of the middle ear to the wall of the inner ear are three small bones (ossicles) known as the hammer (malleus), anvil (incus), and stirrup (stapes). These tiny bones function as a kind of lever mechanism in transmitting the motion of the eardrum to the inner ear. The airspace of the middle ear is connected with the nasal cavity by the eustachian tube. This opening provides ventilation of the middle ear and permits equalization of air pressure inside and outside the eardrum.

Between the middle and inner portions of the ear are two openings in the bony partition: the oval window and the round window. The footplate of the stirrup fits into the oval window in such a way as to respond with a rocking motion when vibration causes movement of the drum membrane and ossicular chain. The round window is closed by a flexible membrane which permits movement of the fluid in the inner ear when changes in pressure occur at the oval window.

The inner ear is a highly complex and delicate structure embedded deep within the temporal bone. It occupies a space that is shaped like a snail shell and is known as the cochlea. Within the cochlea is an intricate arrangement of cells that make up the organ of hearing. This organ is supplied with nerve endings from the eighth cranial nerve, which carries auditory impulses to the brain. Adjacent to the cochlea and continuous with it are the vestibule and three semicircular canals. These chambers also have special sensory structures that are supplied by a branch of the eighth nerve. Their function is to provide the sense of equilibrium.

In addition to the specialized structures of the inner ear, the whole labyrinthine chamber is filled with fluid that serves as the medium for conveying vibration or movement to the enclosed sensory organs.

Beyond the stage of cochlear reception hearing becomes a function of nerve and brain activity. For the most part this process defies simple description. However, some of the significant biological functions of hearing can be presented briefly (*4*). In its simplest form hearing is unconscious. The hearer reacts to the background of sound in his environment without being aware of most of it. Any sudden change or unusual pattern of sound is likely to raise hearing to the signal or warning level. At still higher levels of function it permits communication by language and appreciation of auditory beauty. Each of these functions is important to the comfort and well-being of the person. Even the unconscious perception of background noises establishes a sense of contact and unity with the environment; lacking it, one is likely to feel isolated and uneasy. At the signal level hearing serves the practical purposes of protecting the person and directing much of his activity. The most important aspects of this function in humans are at the intellectual and social levels, where hearing permits easy acquisition of language and fluent oral communication.

Medical Treatment

I will not attempt to review the problems of medical treatment and restoration of hearing in patients whose auditory handicap is temporary. Among children this group is large. It constitutes an area in which programs for the conservation of hearing are highly fruitful. Much of the deafness caused by infections in the middle ear or other obstructions to the transmission of sound can be corrected or alleviated by surgical or other medical treatment (*5*). With prompt and proper care most children having conductive deafness can be treated successfully. This is true for adults as well as children, but conductive impairments in adults are not so commonly without complications.

A significant cause of conductive deafness in adults is a change in the bony wall of the inner ear known as otosclerosis. Certain pa-

tients with this condition are suitable candidates for the fenestration or the mobilization operations. If such treatment is successful, these patients usually regain sufficient hearing to understand speech satisfactorily although the acuity for sound is not likely to be entirely normal.

A significant number of children and the majority of adults with difficulty in hearing have some degree of perceptive deafness. This means that either the inner ear or the auditory nerve fails to respond normally to sound. In most instances this type of deafness cannot be corrected by any type of treatment, and for many of this group, compensation by the use of hearing aids and educational rehabilitation are particularly important.

Compensatory Skills

The variations that may occur in auditory impairments are many. However, there are basic principles that apply to deafness in general. The problems of each individual may be expected to vary not only with the type and degree and age at onset of his deafness, but with other physical and mental characteristics and with the environment in which he functions.

Despite some misconceptions about the more subtle problems that are created by deafness, there is general cognizance of the basic nature of the handicap. Most enlightened persons now realize that deafness is primarily a sensory deprivation and an obstacle to communication rather than an intellectual defect as it was once thought to be. Most people know that deafness usually can be compensated for to a successful degree by the development and utilization of other senses and skills. They know that most deaf persons can and do take responsible and productive places in society. It is doubtful, however, whether many people are aware of all the means by which this compensation is achieved. Probably few understand the pervasive psychological and social significance of deafness. The very fact that the communicative handicap looms so large tends to obscure other aspects of the problem.

In the normal person, hearing and vision work together in a supplementary relationship to orient him to both his immediate and his distant environment. Vision is directed primarily to the foreground, while hearing is nondirectional, encompassing the background as well as the foreground. Vision is limited by darkness and by obstructions and is essentially nonfunctional during sleep. Hearing functions keenly in the dark, around corners, through most doors and walls, and even to a substantial degree during sleep. If this comparative analysis of the two major senses were to be continued into every detail of our lives, we would understand why Helen Keller has said that she regrets the lack of hearing more than she does the lack of sight.

In the absence of hearing, vision must carry most of the burden of perceiving things at a distance, although the tactile sense may be employed for this to some extent. For example, most deaf persons are able to feel the vibrations produced by an airplane overhead or a clap of thunder or the stamp of a foot on the floor. From time to time speculations have arisen as to whether the deaf as a group possess keener visual acuity and sharper powers of observation than do those with normal hearing. Although this supposition has not been demonstrated conclusively, it has a sound underlying premise. It acknowledges that the security of the individual is threatened by the sensory defect and the individual thus threatened is challenged to mobilize his remaining resources more effectively. He develops compensatory skills in order to meet the demands of his environment.

In addition to visual and tactile impressions, the deaf person may develop an acute awareness of kinesthetic sensations. This helps him to feel and interpret his own movements more effectively and becomes an important gauge for controlling the production of speech. Individuals differ in the extent to which the kinesthetic sense develops naturally, and no method is certain to produce efficient kinesthetic control of speech muscles. However, if a patient is properly encouraged to attempt speech and to pay close attention to the visual and tactile clues, he can usually establish some muscular feeling for speech (*6*).

Persons who lose their hearing after speech has developed usually retain much of their articulatory skill, but over a period the quality of their voices is likely to change considerably.

Their speech usually remains intelligible to most listeners, although it may lack proper intonation and rhythm. Early attention to visual, tactile, and kinesthetic sensations should do much toward maintaining adequate speech after loss of hearing.

The speech of persons with partial deafness may be expected to vary with the type, degree, and conditions of onset of deafness. The partially deaf person most commonly hears the vowel sounds and most of the rhythm patterns while missing many of the consonants and much of the inflection of the voice. Frequently this results in articulatory difficulty and some degree of monotony in vocal quality. Partially deaf persons are likely to be unaware of their speech disorders because they reproduce speech as they hear it. The first step in treatment for this group is to determine whether amplification will improve the auditory signals that are desired. The majority of those with moderate to severe deafness can learn to use a hearing aid to some advantage. Occasionally the use of a hearing aid is the only requirement for adequate rehabilitation of a partially deaf person; more often it is necessary or at least desirable to provide training in auditory, visual, tactile, and kinesthetic perception.

Use of the Hearing Aid

It is impractical to lay down a rigid set of standards for the determination of benefit from a hearing aid. Most of the values are relative. That which is significant to one person may be unimportant to another. Even two individuals whose audiograms are identical may not benefit equally from amplification. One may distinguish sounds well enough to derive considerable help in understanding the speech of others, while another may benefit primarily by the increased sensation of his own voice. No person with perceptive deafness should expect complete compensation. A hearing aid does not improve the ability to hear; rather it may improve the signal to be heard. Despite this fact and despite all the limitations and problems imposed by hearing aids, they have been a tremendous boon to millions of people with partial deafness. Certain general principles and guideposts may be used in helping to determine who should wear a hearing aid.

It is appropriate to consider a hearing aid for most persons with a permanent loss of hearing in the better ear of between 35 and 95 decibels for speech frequencies. The greatest degree of benefit and satisfaction from amplification is likely to be experienced by those with hearing losses for speech of from 35 to 75 decibels. Most persons in this group can learn to use a hearing aid well enough to permit satisfactory communication under favorable circumstances. The majority of them can develop and maintain intelligible speech. With a combination of personal initiative, proper training, and use of a hearing aid, the handicap produced by moderate degrees of deafness can be reduced to a minimum. In most instances it need not interfere with pursuit of normal vocational and social activities.

It is not uncommon to find individuals with losses of from 75 to 95 decibels who cannot tolerate enough amplification to do any important good. This is the usual circumstance for those with losses greater than 95 decibels in the speech frequencies. Nevertheless, if any hearing for speech remains, it is advisable to try a hearing aid and to provide training in the use of residual hearing. As a general rule, those who have heard enough to acquire normal speech and language before their loss of hearing will derive greater benefit from amplification than those who have never been accustomed to interpreting sound patterns. Also, those whose audiograms are relatively flat may expect better results than those with markedly falling curves or other highly irregular patterns of auditory threshold.

The physical inconvenience of hearing aids has always been a factor in discouraging people from using them. This, combined with false pride and the substantial expense of the instruments, has deterred their acceptance to a considerable extent. The fact that a moderate impairment of hearing is not readily apparent seems to promote the tendency to hide it, or even to deny its existence. This obstacle and that of inconvenience have been reduced greatly in recent years by the development of small, highly efficient, inconspicuous instruments. It is obvious that consumers have paid for this development by numerous and ex-

AFIP Photograph

Auditory training in speech discrimination with background noise.

pensive purchases of hearing aids. It is no secret that many users of hearing aids have bought 2 or 3 or even more instruments before they learned to use one effectively. The justification for the usual price of a hearing aid is that the agent is supposed to provide extensive service to those who find it difficult to learn to use the instrument. Part of the adjustment of a person who wears a hearing aid includes an understanding of the operation and maintenance of the instrument (*7*).

Auditory Training

Auditory training and practice in listening can play an important part in the adjustment to a hearing aid. Many new sounds are introduced by the use of an instrument, and virtually all sounds are changed in quality. It is difficult for many persons to become accustomed to these changes. Although they receive more sound than they did without amplification, it may have little value until they learn to interpret it. This learning may be facilitated by instruction and systematic practice. In a complete program of auditory training, opportunity is provided to progress from relatively easy distinctions between sounds that are grossly different to finer and more complex discrimination. The stimulation may range from the booming of a drum or blaring of a siren to the rustle of leaves or

the production of a voiceless consonant. When it is attainable, the emphasis in discrimination is placed on interpretation of speech. Listening for pleasure is encouraged by using rhythm and music for auditory stimulation.

Both the starting points and end results of auditory training vary widely for different individuals. Some may never achieve more than gross discrimination, while others can learn to distinguish words effectively. Although the degree and type of deafness and the effectiveness of auditory training usually are related, no fixed rule can be applied to determine the exact value of such training. It must be assumed that all persons with some residual hearing have the potentiality for utilizing it to advantage. An extensive program in auditory training is recommended particularly for children who have never heard well enough to acquire normal speech and language and for all those who experience unusual difficulty in adjusting to a hearing aid. Hopkins and Hudgins (*8*) have suggested that even though it is not possible to predict from the audiogram how much a child will profit from auditory training, all acoustically handicapped children seem to derive some benefit from it and should have every opportunity to continue training throughout their school lives.

Schools for Children

Children with deafness of less than 60 decibels for speech usually can adjust and make satisfactory progress in the regular classroom if they have learned to wear a hearing aid and are given a moderate amount of special help in the development of communicative skills. Those with losses of between 60 and 75 decibels are likely to need a substantial amount of special help, but many can participate profitably in the program of the regular school. If proper instruction is available and if adequate adjustments are made, it is desirable to keep these children in the regular classrooms. When circumstances are not favorable for a partially deaf child in the regular classroom, or if he fails to adjust to this environment, it may be necessary to provide a special class or special school environment. For children whose deafness for speech is greater than 75 decibels, it usually is best to provide a special school that is large enough for appropriate grouping and is staffed by teachers who are highly trained for teaching the deaf (*9*). Those whose losses of hearing for speech are greater than 75 decibels usually have considerable difficulty in learning; the results are limited even after a period of training and adjustment.

Speech Reading

When hearing is absent or nearly so, the principal means of compensation is visual perception. Regardless of the degree or kind of deafness, lip reading—or more properly, speech reading—can play a vital role in the process of rehabilitation. For countless numbers of persons with mild impairments of hearing, the practice of speech reading permits adequate adjustment for normal activities. For those who are severely deaf it is the chief means of understanding the speech of others. For those with moderate degrees of deafness it complements the auditory function in a remarkable way. Fortunately, the elements of speech that are weakest in acoustic power, and therefore are heard poorly, have distinctive positions or movements that are readily visible.

All persons who see adequately can read speech to some extent. Every gesture and expression that a speaker exhibits gives the listener certain information. As gestures of the hands and body can come to have meaning, so can motions of the lips, tongue, and face. Interpretation of these motions is, of course, the skill known as speech reading. It must be borne in mind that by no means all the positions and movements of the speech structures are visible to the observer. He sees only partial patterns and those only fleetingly. There are several pairs of consonant elements in which positions and movements are visibly the same. This causes many words and phrases to appear identical. Often the speech reader must rely on context and a sense of appropriateness to determine what has been said. Differences in the way people speak also contribute to the problems of the speech reader. People who talk with little movement of the lips with cigarettes and pipes in their mouths are difficult to understand. Extremely rapid or unusually slow speech is hard to interpret. Unique skill

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and artistry is required for becoming highly proficient in speech reading. On the other hand, nearly everyone can do it to some degree; but often the main task in teaching speech reading to adults is to convince them that it is within their power to grasp it.

The ability to read speech varies just as other abilities do. In some it develops naturally, even without special training. Others require laborious teaching, and still others never become proficient. It seems to depend more on an inherent knack or aptitude than on general intelligence or diligent study (*10–12*). The person who can seize partial clues instantaneously and synthesize them into meaningful patterns is likely to be adept at reading speech.

It is difficult, if not impossible, to assess or predict the degree of accomplishment that will result from instruction in speech reading. Nevertheless, it is appropriate to provide well-planned programs of instruction and practice for all those with a significant impairment of hearing. Practically all educational programs for acoustically handicapped children should and do include training in speech reading. Many programs of instruction for adults as well as children are made available by the chapters of the American Hearing Society and by other agencies such as university clinics for speech and hearing therapy and community evening classes. There is need for expansion of these services, but an ever greater need is for the acoustically handicapped themselves to learn of the benefits that can be gained by a determined effort to overcome their handicap.

Comment

Important as oral communication is, it is not the only means of communication and it is not a prerequisite for acceptable behavior or competent performance of many tasks. The deaf or hard of hearing person should be encouraged and guided in the development of appropriate compensations that will provide a sense of security and satisfaction. Frequently, this may be done most effectively by emphasizing activities and abilities that are not directly dependent on hearing. The deaf person who excels in his work or play, whatever it be, will find that the communicative problem is lessened. Actions do indeed speak more strongly, if not louder, than words. An accurately drawn blueprint, or a finely tailored garment, or a beautifully prepared meal will speak eloquently for itself. The producer need not give nor listen to an oration on its merits.

Auditory impairment of any degree need not interfere with acceptable behavior and development of a child nor with useful and happy adjustment of an adult. Acceptance of this premise should not be interpreted to mean that deafness is no handicap. On the contrary, it must be recognized that any significant degree of deafness imposes a serious deprivation. Only by acknowledgment and careful assessment of the handicap can proper adjustments and appropriate compensations be made.

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Rehabilitation

Program for the Cerebral Palsied

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CEREBRAL PALSY is characterized by paralysis, weakness, incoordination, tremors, involuntary motion, excessive rigidity, or stiffness caused by pathology of the motor centers of the brain. This affliction may apply technically to adolescents, adults, or the aged. However, cerebral palsy is usually considered to mean those conditions resulting from an anomaly, injury, or disease that originates in the developing infant before or during birth or in the first years of growth (*1a*).

Damage to the brain may result in involvement of the upper and lower extremities and frequently includes the muscles of the trunk, neck, head, face, and breathing mechanism. Because cerebral injury is not limited to a single area in the brain, numerous associated defects may accompany motor involvement. These may include one or more defects in speech, hearing, or vision, mental retardation, convulsions, and behavior disorders. The classification of various types of cerebral palsy is based on physical signs. A high percentage of cases may be classified either as spastic or athetoid types. In athetosis the individual displays involuntary, incoordinate, uncontrollable, purposeless movements. The spastic condition is characterized by the appearance of stiffness. Usually the spastic is able to move the affected limb voluntarily, but the motion may be explosive, jerky, slow, or poorly performed (*2*).

The number of cerebral palsied in this country is difficult to determine. Three major studies analyzed in 1955 indicate that the prevalence rate of cerebral palsy is between 300 and 350 cases per 100,000 population (*3*). Of this number, 100 cases are under 21 years of age and 200 are 21 years of age and over. On the basis of the above figures it is estimated that the total number of cases in the United States falls between 495,000 and 577,500.

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Habilitation

Because of the congenital or early life injury, the cerebral-palsied child will grow and develop in an atypical personal and social environment. This often leads to a poorly adjusted, dependent, socially incompetent person who may be more disabled by personality deviations than by his physical or mental limitations. An individual handicapped later in life has had an opportunity to develop normal living patterns. A child handicapped throughout life has not. This factor underlines the essential difference between habilitation and rehabilitation. The development of basic life adjustment patterns as part of treatment and training is the goal of habilitation. Through this process, individuals are helped to become independent and useful citizens within the limits of their disability.

The process of habilitation must, therefore, begin early if it is to help the child develop proper habits and attitudes about himself and others which will serve as a constructive basis for adjustment to the demands of society.

It is desirable to achieve the following habilitation goals (*1b*):

- The patient should be capable of some form of locomotion, either independently or by means of crutches or other types of apparatus.
- He should be capable of self-care and self-

help in eating, dressing, toileting, and similar activities.

- He should possess an effective means of communication, by speech, writing, or other means.
- He should appear as normal as possible.
- He should be able to earn money, or its equivalent, through his own efforts either in competitive industry or in a sheltered workshop.
- He should be able to employ his spare time in self-satisfying avocations and in social contacts.

To achieve these goals, habilitation of the cerebral palsied cannot be considered from a single aspect. Emphasis must be placed on the problems as they affect the "whole child." Unless the medical, psychological, social, educational, and vocational needs of the individual are integrated into a program, the cerebral palsied will not be served adequately. The multiplicity of handicaps creates diverse and complex problems necessitating the provision of many types of costly services and a lengthy habilitating process. It is rarely possible for one group working alone to provide the necessary services. The responsibility for service must be shared by the individual, the family, and the community, all working toward a common goal.

Community Planning

Total habilitation requires the interrelationship of all health services. These depend on one another and must be closely coordinated to be fully effective. By utilizing the entire resources of the community, the highest potential of the cerebral palsied can be developed. Only in this manner can the economic burden on the family be relieved and the child grow up to become a productive, better adjusted member of society.

In a sound community program special services for the cerebral palsied will be integrated with the existing general health, welfare, and education programs. If necessary, the various agencies should modify existing programs to meet the needs of the cerebral palsied. One way of accomplishing this is to employ specialists in this field to work with the personnel of the general service agencies. If proper facilities do not exist or cannot be extended or supplemented, it may be necessary to establish separate services for the cerebral palsied (*4a*). However, such services should be based on need rather than on the desire of a small group to control a separate program.

A buttonhook assists a trainee in dressing. The Institute for the Crippled and Disabled makes much use of such simple devices in furthering self-care abilities.

The community plan for direct habilitation services should include—

- Help for the parents and family as early as possible so that they can learn to live with and understand the child with cerebral palsy.
- Medical services which have the facilities for early diagnosis, therapy, surgery, and general health care.
- Special educational programs that meet the needs of the child with brain damage and associated disabilities, especially mental retardation.
- Vocational guidance, training, and placement to help develop full use of the individual's vocational capacities.

• Sheltered workshops for those who cannot meet the competitive demands of industry and for those who need special work preparation.

• Homebound work programs when workshops are not available or are inaccessible.

• Recreational or diversional activities to meet the needs of those who are too disabled to perform in a workshop program.

Parent Services

Although parents are not usually considered as a service, no one else in the child's program will become more involved in habilitation. The parent might be considered as a catalyst. With proper care, favorable attitudes, support, and encouragement, the child's chances for success can be greatly enhanced. Without proper parental help and guidance, the child's chances for performing at maximum capacity will be retarded. Because the mental health of the family is a vital part of the habilitation process, it has become a requisite in the treatment of the cerebral-palsied child to clarify parental attitudes concurrently with the child's therapeutic program. If aid for the family unit is planned as part of the complete treatment program, the chances for success of the habilitation effort will be increased.

The emotional impact of having a crippled child; the feeling of guilt, resentment, and insecurity; and the practical everyday problems of raising the child must be carefully considered. Some of these problems can be alleviated through educational and counseling programs and by forming parent groups who will share the fatiguing burden of constant care and attention. Through education, parents get an opportunity to understand the needs, wants, abilities, and limitations of the cerebral palsied. The program should stress the parents' role in encouraging the child to develop independence and especially in striking a balance between too much protection and encouragement and too little. Through counseling programs the parents gain insight into their feelings of guilt and ambivalent attitudes toward their child and the reasons for family conflicts. By study, observation, and counseling they will come to see their cerebral-palsied child more objectively as an individual and as a personality. In this manner a sounder parent-child relationship can be established (*4b*).

The parents become the cornerstone upon which the child builds a foundation for adjustment. Behavior maladjustment in the cerebral palsied may result from organic brain damage, frustration caused by the handicap, or rejection by the parent, family, or society. It is, however, generally believed that environmental factors have a greater effect on personality deviations than the brain injury condition. The personality characteristics of a secure, mature, loved child may have greater prognostic significance than the disability itself. A leading medical authority in the treatment of cerebral palsy states, "As yet no one is able to prognosticate what a well-motivated child with even a severe disability and mental retardation can accomplish if given adequate treatment and parents who are interested in helping the child" (*5a*).

Medical Treatment

Treatment and habilitation of the cerebral palsied should be used synonymously. The overall therapeutic approach must take into consideration that the child has not been able to develop normally. It must, in addition to therapy, help the child gain security, promote relaxation, and relieve anxiety in both the child and his parents (*6a*).

The goal of treatment is to help the individual function as effectively as possible with special emphasis on learning to perform activities essential to daily living. The logic of the treatment aims is pointed out by Deaver. "Learning to perform the activities necessary for daily living begins as soon as the disabled person wakens in the morning. There is little value in being able to ambulate if one is unable to get out of bed, dress, or attend to one's toilet needs. The abilities to ambulate, speak, use the hands in self-care activities, write, or produce salable goods are necessary for economic independence. Education is desirable but no one is paid for the knowledge in his head. If a person cannot speak adequately or use the hands, of what economic value is an education? It is for these reasons that learning to perform the

activities essential for daily living should be the primary objective of all treatment" (*5b*).

The general methods of treatment are physical restorative services, surgery, drug therapy, and treatment for associated defects. Physical restorative services are more frequently recommended than any other type of treatment. Among these services are physical therapy, occupational therapy, and bracing aids.

Physical therapy is primarily concerned with improvement of locomotion, stretching exercises, muscle reeducation and strengthening, and improvement in balance. Occupational therapy is mainly functional. It attempts to teach and develop self-help skills and feeding and dressing techniques. This is usually accomplished through exercises designed to improve reach, grasp, and fingering abilities. Bracing is the principal method used for preventing and correcting deformities, supporting the body weight, and controlling involuntary movements (*1c*).

Surgery and drug therapy are used as aids in achieving physical restoration. Surgery is utilized only to surmount some definite obstacle to progress. The purpose is to improve functional mobility and appearance. In general, there is a cautiousness concerning surgical intervention. It has been stated that physical restoration in growing children, such as achieved by physical therapy and bracing, should always be given an adequate trial before surgery (*7*). However, there have been enough advances reported in orthopedic and neural surgery to consider it a major treatment method.

Drug therapy has been used with widely varying results for convulsions and muscle relaxation. A great deal of research is presently being conducted on all phases of drug therapy. The control of seizures through the use of such drugs as Dilantin and phenobarbital has been found effective and is presently widely used. It was found in a study just completed at the Institute for the Crippled and Disabled that certain drugs tend to relax tight or spastic muscles, making therapeutic exercises more effective. Another drug used in the same study was found to help reduce athetoid tremors and uncontrolled movements. The reason seemed to lie in its unique ability to prevent emotional tension from restricting physical performance (*8*).

Any handicapping conditions accompanying cerebral palsy should be treated as early as possible for they can seriously impair the entire habilitation effort. The child who cannot express his feelings because of serious speech involvement may find an outlet in a temper tantrum or negativeness which in turn may interfere with a consistent therapy program. Speech therapy assists the child to improve the ability to communicate by means of speech or other methods. It attempts to develop proper breathing habits and improve such secondary factors as drooling, grimacing, swallowing, and chewing. The speech therapist also gives audiological assistance to those who need hearing training. The cerebral palsied with visual perceptual impairment may have more difficulty learning to travel independently because of the inability to judge distances of an oncoming vehicle. An untreated squint, for example, may result in deterioration of vision. Qualified ophthalmological care is essential to improve crossed eyes, prevent and treat impaired vision, and relieve headaches or other results of eye strain. Dental care and nutritional needs must also receive continual attention (*9*).

The complexity of the varying handicapping factors makes it difficult to prognosticate the benefits to be derived from treatment. Parental acceptance and understanding, severity of the physical disability, and mental capacity are important considerations. Denhoff suggests the use of the pneumoencephalogram technique to determine the degree and location of brain lesions. These findings have been used as a basis for predicting potential for "good futures" (*6b*). However, he cautioned that this technique does not take into account the multifaceted problem of personality, family, or social factors, which also influence the achievement of habilitation goals.

Educational Planning

Education must be considered as part of the total habilitation process and cannot be realistically separated from other therapy the child receives. In most communities, clinic activities

Playback and mirror aid in speech therapy.

and educational programs are planned together to provide for a closely integrated program of physical therapy, occupational therapy, speech therapy, and special education. The therapists and teachers, to be fully effective, should at the same time aim at the common goal of developing a well-adjusted child as far as physical and mental abilities allow. Especially is it necessary that the educational process help establish a feeling of self-respect and self-confidence, and provide the opportunity to achieve success and gratification. The cerebral palsied must be helped to face his limitations realistically and at the same time be encouraged to utilize his capacities to the fullest.

Brain injury can so complicate the normal learning process that it is important to know about mental as well as physical limitations. By being thoroughly familiar with each child's problems, the most appropriate teaching techniques can be utilized. For example, many cerebral palsied with visual perceptual deviations have great difficulty seeing what others see when they look at the same object. It may appear distorted to the child, leading to an inappropriate or incorrect interpretation. The influence of this difficulty on the ability to read may be very handicapping and will probably affect the whole course of the individual's academic development. If this visual defect is known before assignment to a class, techniques such as special lighting or having the child hold reading material on a vertical rather than a horizontal plane may improve performance.

By recognizing the handicaps that affect the ability to learn, many personality disturbances resulting from failure and frustration can be avoided.

Another educational problem is the large proportion of mental retardation found in the cerebral palsied. An analysis of a number of studies revealed that 72 percent of those with cerebral palsy have below normal intelligence quotients, compared with 16 to 25 percent of the general population (*4c*).

Educational facilities should include a special class for the cerebral palsied who display multiple handicaps and mental retardation. Other children can be placed in special classes for all the orthopedically handicapped or in a class for the slow learner if the physical involvement is not too extensive. For those who cannot get to school because of severity of the disability or transportation difficulties, home instruction should be considered. This type of school placement is the least suitable because it deprives the individual of the social experience of meeting and being with other children. The goal should be to place the cerebral-palsied child in a normal setting as soon as he is capable of profiting from the experience.

To the extent possible, education should be directed toward economic usefulness and productiveness rather than solely toward the fulfillment of academic achievements. In order to accomplish this, a total educational program must be provided. Unfortunately, many communities provide for special elementary education but do not have special facilities for secondary education or vocational training. The individual with mild physical and mental impairment is usually placed in the regular or normal curriculum after the elementary program. However, the cerebral palsied with moderate to severe handicaps may have vocational potential if vocational training is made a part of the educational process. The emphasis in this group should be on semiskilled, unskilled, or service (porter, messenger jobs) rather than on academic or skilled-trade training. This type of program offers direction and is meaningful to the adolescent. It helps him accept his limitations but allows for training within his vocational capacities.

Vocational Adjustment

The cerebral palsied encounters many obstacles as he approaches adulthood, but few will be as disheartening or as frustrating as the search for employment. A survey of 200 ambulatory adults in New York City revealed that only 42 were employed (*10*). Two studies in Schenectady and Erie Counties in New York State indicated that 61 percent of the cerebral-palsy population were unemployed and 16 percent were employed part time (*11*). Similar results could be found in every community.

At the Institute for the Crippled and Disabled in New York City, we are investigating the vocational difficulties encountered by the adult cerebral palsied. Each individual, during a 7-week period, is given the opportunity to work at more than a hundred different jobs, covering a wide range of related employment opportunities. In addition, his social history and mental and physical functioning are thoroughly investigated (*12*).

The study thus far includes 110 cerebral palsied whose average age is 22 years. Persons selected for the study were considered to have serious employment problems by the New York State Division of Vocational Rehabilitation. It was found that 60 percent of the group demonstrated employment potential. The remaining 40 percent could not meet competitive industrial standards because of physical, mental, or emotional difficulties. Also noted was the fact that 52 percent displayed behavior deviations that affected maximum performance. The majority of the cerebral palsied studied were not ready to make the transition from school to work. They had no idea of the kind of work they could do nor did they understand the responsibilities placed upon an employee or the demands of a work situation. Anxiety concerning inability to compete with the normal population was noted in 75 percent. Undoubtedly, this was an important reason for the high proportion of behavior maladjustments.

It was also found that those in the group that did not demonstrate employment potential were more physically or mentally handicapped than the others. In addition, the more impaired group generally displayed more acute

emotional difficulties. These findings indicate that a proportion of the cerebral palsied are too handicapped physically to be able to compete under normal industrial conditions. This creates a severe and irresolvable vocational problem unless some special resource is established to meet these employment needs. In some instances this might be a sheltered workshop, a homebound work program, or, for those very severely involved, a recreational or diversional program. The study indicates that the inability to adjust vocationally is due, in part, to the lack of vocational facilities. This limitation is a major contributing factor which intensifies the behavior disorders prevalent in the adult cerebral palsied. It was noted that the young person who is severely handicapped does not display the extent of personality deviation that is apparent in the older person who has been idle for many years.

As pointed out in a previous section, there are few vocational training opportunities for the cerebral palsied. In the group that demonstrated employment potential, 92 percent had not received any vocational training, although 32 percent had completed high school. This factor is particularly serious for the habilitant whose experience is so restricted. Adequate training, even if it is at the lowest skill level, can instill in the individual a feeling of personal worth and confidence. It also can help the cerebral palsied to learn the importance of taking responsibility, of following instructions, and of getting along with others. These are basic factors in making a satisfactory vocational adjustment and are important in the habilitant's development.

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Rehabilitation

Speech Problems of Hemiplegics

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ONE of the most significant disabilities in terms of the number of patients seen is hemiplegia, usually the result of brain damage following thrombosis, embolism, hemorrhage, or trauma. Some idea of the magnitude of the problems may be gleaned from the fact that vascular lesions affecting the central nervous system ("stroke") is listed as the third major cause of death in the United States, ranking behind only heart disease and cancer. The majority of patients sustaining a stroke of apoplexy do not die from the initial insult. Instead, they improve to a greater or lesser degree and often live a number of years despite their residual disabilities. No definitive statistics are available on the number of hemiplegics in the United States, but estimates have been as high as 1,500,000.

One aspect of hemiplegia which is far too frequently overlooked is the communication disabilities resulting from brain injury among a high percentage of hemiplegic patients, especially those whose hemiplegia is on the dominant side. Conventionally, it is assumed nothing is to be done for such patients, whereas in fact these disabilities are frequently remediable. These communication problems may be of two kinds, aphasia or dysarthria.

Aphasia

Aphasia is a language disability which affects one or more aspects of language: speaking, reading, writing, or understanding. Aphasia may also involve difficulty in calculation or in using gestures. The possible predominant symptoms of the four types of aphasia are shown in the chart.

Patients who have hemiplegia with accompanying communication difficulties are classified, after testing and evaluation, on the basis of these symptoms. It must be remembered that "aphasia" can apply only to cases in which there is known brain injury.

Among aphasic patients the range from mild to severe difficulty is wide. Therefore, the term "predominantly expressive type aphasia" may be applied to an individual who has only occasional difficulty in finding an appropriate word and may be slowed down in his ability to write words, as well as to an individual who is totally unable to express his thoughts in written or spoken words. In the first example the patient described might still be capable of adequate on-the-job performance despite his language disability. The patient in the second example probably will not be able to work and will be forced to lead a sheltered life at home or in an institution.

It is essential that the aphasic patient's functional language ability be assessed at the time of evaluation. The language demands of daily life, for example, telephoning and reading street signs, form the basis for this functional evaluation and for future therapy. Obviously, it is considerably more important for the aphasic patient to be able to say his name, to sign a check, and to ask for a drink of water than it is for him to be able to recite the alpha-

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bet, spell a given list of words, and diagram sentences from their grammatical components.

At evaluation, the patient's ability to meet the language demands of daily life are classified, from highest to lowest, according to four functional levels: vocational adequacy in language, home adequacy in language, rehabilitation center adequacy, and institutional adequacy in communication.

Patients at the first language level may qualify for vocational placement, although not necessarily in their former vocation.

Patients on the second level can function at home. They are able to make their daily wants known and have sufficient receptive ability to manage the telephone, to read, to understand signs, and so on.

Patients with rehabilitation center adequacy are considered able to follow a rehabilitation program. Their comprehension is adequate to permit attendance in group and individual classes. They can use the elevator without assistance and can follow the nurse's and the therapist's instructions.

Patients who have only institutional adequacy in communication are unable to perform any of the higher level activities.

The principal factors which affect the patient's progress during language rehabilitation are motivation and "need" for speech, extent of damage and severity of symptoms, ability to learn new material, and attitudes of the patient's family toward his language problem. In addition, the patient's personality before the onset of aphasia seems to have an effect on his language recovery. In some patients who were very withdrawn premorbidly, the effect of an aphasic condition appears to be minimal; their "need" for language is limited. On the other hand, persons who were greatly depend-

Possible Predominant Symptoms of Four Types of Aphasia

	Expressive symptoms	Receptive symptoms
predominantly EXPRESSIVE	Mild to severe difficulty in *using gestures with or in place of speech* *naming objects* *speaking phrases and sentences* *carrying on a conversation* *putting thoughts into writing*	Any receptive deficiencies may exist but will not be as marked as expressive deficiencies
predominantly RECEPTIVE	Any expressive deficiencies may exist but will not be as marked as receptive deficiencies	Mild to severe difficulty in *recognizing people* *recognizing objects* *understanding speech* *understanding written language*
EXPRESSIVE-RECEPTIVE (mixed)	All predominant expressive symptoms	All predominant receptive symptoms
GLOBAL	No apparent ability to express oneself by gesture, speech, or writing	No apparent understanding of spoken or written language

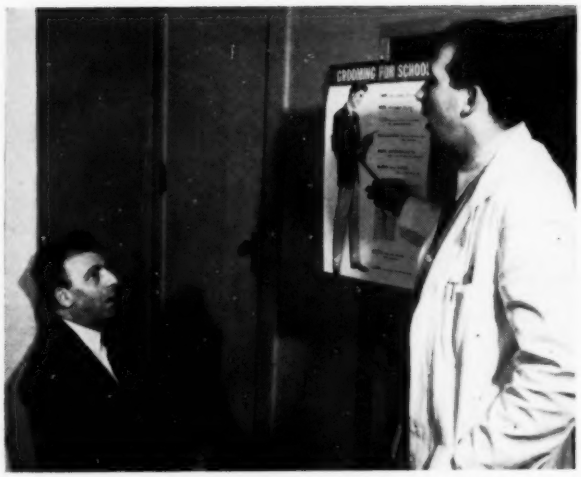
ent on language skills premorbidly for their social and intellectual welfare are more likely to feel a greater need for language.

Our experience shows that, with few exceptions, all aphasic patients who have had the benefit of language retraining will make some measure of progress. It can be anticipated that some patients will graduate from one functional language level to another during the course of treatment. In a smaller number, we can expect almost complete return of language function.

Functional language recovery is the primary goal of a language rehabilitation program. Patients who learn language which they can use only under certain clinical circumstances or which they can produce only as automatic responses to specific stimuli are not considered to be making progress. It is the improved ability to use language appropriately when there is a demand for it, without assistance, under average circumstances, that constitutes progress.

Most aphasic patients who are admitted to a language rehabilitation unit are just beginning to use nouns. Therefore, a large number of the techniques devised for use in aphasia retraining are based on learning at the "naming level." Every sensory avenue is utilized to teach the patient language. His hearing and vision are employed. On the naming level the patient is familiarized with the language symbols through seeing the live objects which the noun represents and seeing the word which applies to the object, hearing the word repeated by the therapist, copying the word, matching the word with the appropriate object, and writing the word from dictation.

The proper selection of the vocabulary to be taught to the aphasic patient is essential to a sound retraining program. This is especially true when the patient will be able to learn only a limited vocabulary. If the vocabulary is not functional and realistic, much valuable therapeutic time will be wasted. A basic word list of 100 functional nouns has been designed, and copies are available from the Speech and Hearing Therapy Department, Institute of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center, New York, N. Y.



A hemiplegic patient with aphasia receives speech therapy from a speech therapist.

The physical factors conducive to successful aphasia rehabilitation should be borne in mind when the retraining program is initiated. Sessions should be short and frequent rather than long and infrequent. A quiet, undistracting setting is advisable. The atmosphere for therapy should be permissive, and each session should end on a successful note for the patient.

It is the goal of therapy that the patient's production of each word be as close to normal as possible. However, little or no attention is given to pronunciation; it is more important for the aphasic patient to be fluent than to be perfect in his pronunciation. When a patient has learned a majority of the nouns in the 100–word vocabulary, he is taught verbs in combination with these nouns; for example, pencil-write, spoon-eat. The order of teaching words, according to their difficulty, is nouns, verbs, adjectives, conjunctions, pronouns, articles, and prepositions. In general, the "picturability" of a word and its familiarity to the patient determine its difficulty. Therefore, the names of objects are easiest to teach the aphasic patient. On levels above the noun-verb level, teaching materials designed for teaching English to foreign students are useful.

Contemporary thinking in the field of aphasia rehabilitation seems to indicate that there is a great correlation between language stimulation through listening and language learning. Ear training through repetitive listening can be accomplished by the therapist's

frequent repetition of words and by the use of a machine which repeats words from specially designed tape-recorded cards. Generally all types of auditory training should precede actual speech training and should be used as a supplement to formal speech training.

In any given case of aphasia, it is difficult to ascertain how much therapy will be necessary for the patient to reach his maximum level of language proficiency. Retraining the aphasic patient is a slow process, which usually takes many months. Experience tells us that a trial period of therapy is indicated for all aphasic patients in order to determine whether or not treatment will be of benefit. In many cases, once therapy has been initiated, the aphasic patient can follow a home program under the supervision of a trained therapist or in conjunction with a speech therapy program (*1*).

Dysarthria

Dysarthria is a speech disability based on motor dysfunction of the speech musculature. Dysarthria may affect the production of certain speech sounds, the rate of speech, voice quality, phonation, rhythm, articulation, or any other aspect of speech dependent on motor ability. Some dysarthric patients may be so severely deficient in their speaking ability that they are "mute" or unintelligible. In mild cases of dysarthria the patient has only a slight difficulty in speaking distinctly.

The principal goal of therapy for the dysarthric patient is to increase the intelligibility of speech. To accomplish this the following techniques may be used: imitating and practicing specific sounds before the mirror; repetitive exercises to improve voice quality, resonance, phonation, or articulation; using the tape recorder for critical self-analysis of speed; performing certain physical exercises to increase the accuracy of tongue, lip, and jaw movements. These therapeutic techniques can be of increased benefit to the patient if they are supplemented by home practice.

The potential for the functional recovery of speech skills in the dysarthric patient is usually rather good. Compensatory movements which are nearly normal can often be taught to the dysarthric patient. Many dysarthric patients are able to return to their former vocations following a period of speech therapy.

The differential diagnosis between dysarthria and aphasia is especially important since treatment and functional potential in these two disabilities differ. It is recommended that all hemiplegic patients who exhibit difficulty in communication be evaluated by a professional speech therapist. With this evaluation as a baseline, formal speech therapy techniques and plans for a home program can be more efficiently devised for the patient's recovery. The large numbers of hemiplegic patients with difficulty in communication who have recovered functionally should encourage professional workers in allied fields to refer patients to speech therapists for evaluation and treatment whenever possible.

REFERENCE

(*1*) Institute of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center: Aphasia rehabilitation: Manual and workbook. A practical manual of directions for the untrained therapist. New York, N. Y., 1955, 75 pp.

AUTHORS' CORRECTION

In the article Contributions of Premarital and Prenatal Bloodtesting in Syphilis Control by Harold J. Magnuson et al., published in the February 1957 issue of *Public Health Reports* (vol. 72, pp. 135–141), a recalculation of the confidence limits on figures 1, 2, and 3 does not substantiate the statistical significance previously reported. However, conclusions based on other evidence of significance remain unchanged, and these indicate that rates of infant mortality due to syphilis have decreased with the passage of premarital and prenatal laws.

Rehabilitation

Recovery From Mental Illness

MILTON GREENBLATT, M.D.

IT IS NOT POSSIBLE to discuss with finality the essential nature of disability produced by mental illness because of the complexity of personality development, marked individual differences in adaptation to stress, and great variation in ethnic and cultural milieu in which mental illness develops. However, it is currently assumed by many psychiatrists that mental illness is based primarily on difficulties in interpersonal relations that result in frustration of instinctive needs and strivings whose satisfactions are essential for normal growth and happiness.

The blocking or thwarting of these drives leads to unpleasant states of tension whose specific expressions vary over a wide spectrum. Tension is manifested in some patients by anxiety or apprehension; in others, it is transformed into obsessions or compulsions. Some patients fix their attention upon actual or fancied somatic complaints and become "psychic invalids"; others have major disturbances in autonomic balance resulting in malfunctioning of visceral organs (psychosomatic illness). Still another group is characterized by withdrawal, preoccupation with primitive fantasies, and attempts at resolution of psychic tensions either by inappropriate aggressive action or specialized psychic experiences such as delusions and hallucinations.

From another point of view, mentally ill persons suffer from deep-seated feelings of unworthiness that frequently break out in antagonism to authority, rival figures, or potential objects of affection, and that seriously impair their ability for work, play, or love.

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The Five Areas

There are five principal areas in which rehabilitative efforts to assist a patient should be applied: the patient's own psyche, his vocational and educational capacities, his family, and the social and recreational aspects of the community to which he will return. This concept of rehabilitation of the mentally ill approaches that of total treatment.

Psychological rehabilitation comes first in the hierarchy of concern. We are interested here primarily in reduction or removal of clinical symptoms, resolution of disruptive anxieties and tensions, and neutralization of intrapsychic conflicts. This is primarily a psychodynamic-therapeutic problem and is best managed by intensive individual or group therapy together with all other measures available in the hospital and outpatient setting. It is worth stressing that for many patients there exists a "psychopathological ceiling" which limits adaptational growth very sharply. For these patients, the critical psychological problems first must be dealt with and resolved before further rehabilitation effort can pay off. For other patients, however, though psychological problems may be sharply limiting, marked rehabilitative gains can be made through employment of methods indicated below.

Vocational rehabilitation involves careful assessment or survey of a patient's occupational or vocational interests and capacities, testing

his fitness through occupational assignment, developing old or new skills via occupational or work therapy, and increasing his work tolerance. It proceeds to training outside the hospital setting where indicated, assistance in job placement, and followup of vocational adjustment through contacts with the patient and, where possible and helpful, with the employer. The vocational counselor provides a link with the outside world. Often the anticipation of work and its connotation of status in the community provide a major impetus in stimulating a patient's desire for recovery.

Educational rehabilitation can often be helpful. To begin with, the experience of being mentally ill and of recovering, plus all the self-understanding that recovery usually implies, may make a profound contribution to a person's psychological education. Additional efforts to develop more fully the person's skills, talents, curiosities, and special interests are often worth while. Thus, mental hospitals have included programs of art, music appreciation, language instruction, photography, carpentry and cabinetmaking, the dance, and lectures by teachers of local institutions as part of the rehabilitative procedure. Through the stimulation and support provided by a rich rehabilitative program, many patients have discovered that totally new areas of curiosity, competence, or striving can be developed.

The patient's family is the fourth area in which rehabilitation is important. It seems clear that psychiatry in the future will involve itself increasingly with the family and its problems. Child psychiatry points the way by extending treatment simultaneously to both child and parent. Recent studies indicate that the patient's breakdown is often part of a major struggle going on in the family, with the patient the victim of character disturbances of other family members, longstanding feuds, or basic incompatibilities. The beneficial effects to the patient of hospitalization and the total plan of treatment may be vitiated unless his family also is given considerable support and understanding. Furthermore, major changes within the family may occur as the result of a patient's hospitalization, and these may in turn affect him. Mental or physical stress in one or more family members, stigmatization of the family by friends or the community, moving to another community, or closing of family ranks against him—especially if his illness assumes a chronic course—are examples of changes likely to affect a patient adversely. Thus, the family must be brought within the therapeutic orbit if the patient's rehabilitation potential is to be realized fully.

Experience indicates that the community is one of the weakest areas of patient adaptation and one towards which relatively little treatment effort is directed. Yet it is generally felt that those patients who develop deep roots in the community are least likely to have relapses. The ex-patient may go through the motions of a job, indeed be quite productive, yet be unable to tolerate social contacts, dependent as he is upon ease and naturalness of association and confidence in himself. Part of the difficulty is the unavailability of suitable sociorecreational groups—halfway groups, so to speak—that have the tolerance appropriate to each stage in an ex-patient's reintegration.

Phases of Therapy

There are three phases of the patient's illness during which rehabilitative efforts must be applied: first, during his hospitalization; second, during his transition from hospital to community; and third, during his community life.

In the hospital, rehabilitative emphasis is on achieving a "therapeutic climate," that is, an interpersonal atmosphere calculated to undo the pathogenic relations of the patient's earlier life. Therefore, personnel in the aggregate should be accepting, sympathetic, uncritical, interested, and understanding. Within such a climate three general patterns of treatment may be stressed.

The first form of treatment is intensive, individual psychotherapeutic work with a trained, professional therapist. A steadfast, reliable relationship that explores thoroughly a patient's thinking and feeling can be a remarkable catalyst for growth.

The second aspect of treatment is "milieu" therapy, and here we imply not only the "therapeutic climate" mentioned above but also a program that makes available to the patient

many activities, diversions, and socializing possibilities. Active occupational therapy, recreation, work, and sports programs are essential. Most crucial, of course, are the relationships developed with other persons—staff or patients—in these activities. Often the milieu program can be successfully supplemented by additional group experience such as formal group therapy or patient government.

The third area of emphasis is somatic therapy. Here we include all efforts directed toward removal of physical or physiological handicaps and, in addition, specific somatic treatments, including electric shock, insulin, surgery, and pharmacotherapeutic agents.

Insufficient attention has been paid to the transitional phase of the patient's experience. Upon discharge from a hospital, most patients experience as more or less threatening the severe cultural discontinuity existing between the hospital and the community. Much effort is needed to develop carefully graded steps for the movement of the patient from the hospital to the outside world. In the case of deep-seated chronic illness, weeks or months of arrest in various transitional phases may be expected before the patient is secure enough to resettle himself independently in the community. In this report we can do little more than mention the types of transitional facilities that may be offered:

The day or night hospital. The day hospital has been developed to allow early discharge of patients from hospital residence; however, they may continue their association with the hospital in whatever capacity is needed by returning during the day. This is especially suitable when the home environment is too difficult for the patient to endure for the full day, when patients are as yet unable to work on their own, and when long-term contact with the "therapeutic climate" is necessary. Night hospital patients work during the day but return to the hospital overnight.

The sheltered workshop. The sheltered workshop is most useful when it follows a well-developed work program within the hospital. The patient can absorb additional work training and work "hardening" in a sheltered workshop, where conditions of industry can be approached progressively.

The halfway house. The term refers to a residence arrangement, usually under the guidance of a supervising person, for patients who might profit by group or dormitory living and can earn and help pay for their maintenance. Patients who have no home to go to or who cannot anticipate comfortable acceptance at home may do very well in a halfway house.

Family care. Family care programs may be very successful, especially for chronic patients. The patient is placed with a selected family where he becomes a member who works or contributes up to his capacity. The State or philanthropic agency foots the bill, and the hospital usually maintains supervision through a social worker or public health nurse.

The ex-patient club. Patients and ex-patients have shown they are able to band together successfully in their own interest. Inpatient self-government is a gratifying actuality in many hospitals, and ex-patient clubs are increasing in number and variety throughout the country. In ex-patient clubs, former patients have an opportunity to participate in many group activities and in this way gain assurance and confidence in social situations. Club membership may be a steppingstone to developing more secure community roots and thus may play an important role in prevention of relapse.

Outpatient therapy. Therapy for outpatients is a growing service that proves invaluable to many ex-patients who need group work, long-term supportive or analytic therapy, or who require a course of pharmacotherapy or electric shock treatments. Therapy for the outpatient constitutes a major bulwark of support as well as a defense against rehospitalization.

Community adjustment becomes a natural and easy consequence of these graduated transitional steps back to society. The patient will need considerable support to withstand the stresses and slights felt in interaction with other citizens. Finding a job is often a problem because of the stigma attached to mental illness, and acceptance in the family or social group at times may be achieved only through an uphill fight. Here continued interest and support from the hospital is essential, and in some instances counseling and home visits by a trained

worker can be helpful. Often family members may be encouraged to seek psychiatric help themselves, for a patient's breakdown in many instances can be assumed to be part of a psychopathological family atmosphere. Finally, the hospital has a responsibility of educating citizens in general in problems of mental health and of cultivating good will toward both patients and ex-patients.

What outcome may reasonably be expected under good conditions of care and treatment? Although studies are still inadequate, the expectation is that of 100 acute cases admitted to an active treatment hospital, 80 to 85 will return to the community at various levels of improvement within a few months. Recent followup studies from the Massachusetts Mental Health Center show that 75 percent of male ex-patients are working full time 1 to 2 years after hospitalization. Their earnings at the time of followup equal their pre-illness levels. We know that the lives of ex-patients are often quite impoverished in the social sphere, but we do not yet have systematic data to support this knowledge. While relapses may occur in about 25 to 30 percent of ex-patients, these are often of brief duration. At 5-year followup, more than 80 percent are in the community, and roughly half of the original number have not returned to any institution for psychiatric care.

Employment for the Mentally Handicapped

An estimated 3,600 persons who had mental handicaps were placed in jobs through the State-Federal vocational rehabilitation program during the year ending June 30, 1956. These placements, 28 percent above those in 1955, included many who had not previously been employed. About 2,800 had been mentally ill, and about 800 are mentally retarded. They are among a record total of 66,273 disabled persons restored to productive lives in the public rehabilitation program in fiscal 1956.

The Office of Vocational Rehabilitation, Department of Health, Education, and Welfare, awarded about $3.2 million in support of 245 rehabilitation projects during the year, in addition to the $30 million granted for basic support of State rehabilitation programs.

Nearly 10 percent of the projects were concerned with rehabilitation of the mentally disturbed and deficient, representing a Federal investment of about $400,000.

Projects for rehabilitation of the mentally ill are operating in Connecticut, Massachusetts, New Hampshire, Vermont, New York, Pennsylvania, Tennessee, Kansas, South Dakota, Nebraska, California, and Puerto Rico. Projects for the mentally retarded are carried on in Maine, Vermont, Connecticut, New York, New Jersey, Florida, Wisconsin, Illinois, Texas, and Colorado.

The Road Forward

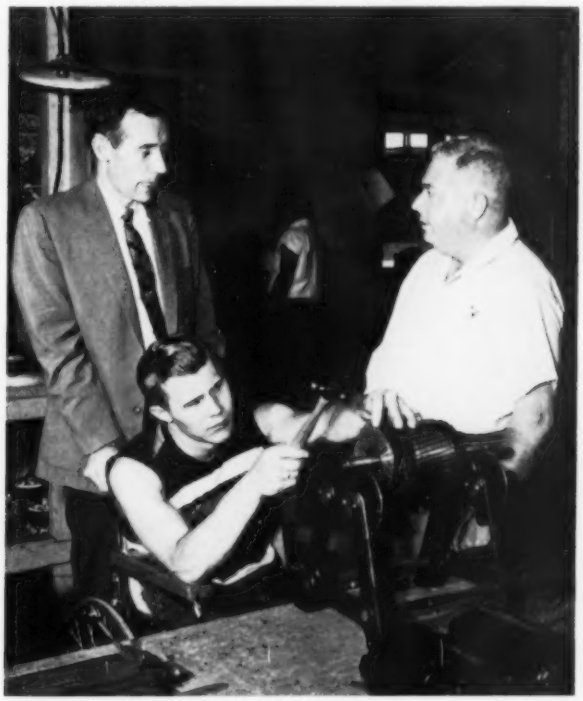
Motoring with friends before taking his Navy induction physical, a 22-year-old Wyoming oil rigger drove his car off a high bridge. The result: He is paralyzed from the chest down for life. But the story only begins there. At the Woodrow Wilson Rehabilitation Center, Fishersville, Va., doctor, psychologist, therapist, guidance expert, and rehabilitation counselor combined their observations into a vocational diagnosis and prognosis and contributed to respective phases of his therapy and training. After months at the center, he is able to make his way as an electrical appliance repairman. He looks forward to an independent, self-supporting life.

A doctor explains to the patient the significance of his injury, shown on an X-ray film. He also advises on physical abilities and limitations and discusses types of work the young man may do.

As part of the vocational diagnosis, a psychologist tests aptitudes, intelligence, and interests.

An instructor at the center teaches the young man how to repair electric appliances of all types.

A physical therapist helps the young man develop the strength he will need to walk with crutches and long braces. He will work from a wheelchair, but exercise in an erect position is essential.



A rehabilitation counselor visits the boy at his new job and talks with his employer to assure that both are satisfied and to iron out any difficulties that may have arisen in the performance of his work.

Vector Control in the United States

A VECTOR, according to Webster's unabridged dictionary, is "an organism, usually an insect, which carries and transmits disease-causing micro-organisms." This is the classic definition of a vector. Since living languages are constantly changing in vocabulary and in word definitions, it is probably only a matter of time before dictionaries will begin to include broader and supplementary usages of the term "vector," consistent with current usage of the word. It is our purpose to define what "vector control" means today and to review the justification for modern vector control as carried on in this country.

Less than 30 years ago, as many as a million cases of malaria annually were estimated to have occurred in the United States, principally in the southern States. As many as a hundred thousand cases annually were attributed to each of several States. While malaria was undoubtedly the leading vectorborne disease, the aggregate incidence of other vectorborne diseases was very high by present-day standards, especially that portion of the dysenteries and diarrheas which is transmitted by houseflies to infants. At the same time, personal services and physical resources available to combat these diseases were negligible in relation to their extent and magnitude.

As recently as 1929 in one State with 100,000 cases of malaria, only one engineer was actively engaged in malaria control, giving part-time service to State and local health departments. It was not only natural but indeed essential under this setting for vector control to be conducted as a highly species-selective sanitation operation, at least in its malaria control aspect.

Such conditions still prevail in many parts of the world. Even though no method of control is completely species selective, focalization of effort against the production and resting places of the vector species, especially of the infected individual specimens, permits this objective to be substantially realized. Moreover, even in the United States, species-selective sanitation is still applicable today for the control and eradication of the yellow fever and dengue vector, *Aedes aegypti*.

All methods of vector control fall within the classic definition of sanitation. Irrespective of whether it is achieved by chemical, physical, biological, or other means, vector control involves the modification of man's environment in the interest of human health and well-being. However, because of the foregoing historic precedents, vector control in the professional and administrative mind has assumed a more selective position than other sanitation methods. Aside from certain special types of public water supply problems employing chlorination as a sole method of treatment, all other commonly employed sanitation measures have broader

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The Committee on Vector Control, Engineering and Sanitation Section, American Public Health Association, presents this fifth annual report in full awareness that imposed limitations on length have prevented giving adequate attention to all aspects of the scope of vector control. Hence, attention has been concentrated largely on the scope and program complexities of mosquito control to the neglect not only of many other important vector species but also of source control aspects, especially in mosquito and fly control. Coverage of these aspects in turn would have more adequately exposed to fuller view the scope of vector control programs from a standpoint of agricultural, industrial, and community relationships. Members of the 1956 committee were John M. Henderson, C.E., chairman, George Bradley, Ph.D., Francis E. Gartrell, D.P.H., Wesley E. Gilbertson, M.S.P.H., Harold Gray, M.S., Ralph S. Howard, Jr., M.S., John A. Mulrennan, B.S.A., Theodore A. Olson, M.A., Richard F. Peters, B.S., and Fred H. Stutz.

purposes and benefits than the direct interruption of disease transmission. By the same token, sanitation in general prevents as well as controls disease incidence. In contrast with this philosophy of multipurpose benefit, vector control concepts have followed more closely the philosophy of the case-finding epidemiologist who pinpoints his efforts on the investigation and control of individual disease outbreaks during or following their occurrence.

Evolving Concept of Vector Problems

The attitude of the public toward vector control, however, almost invariably has been in accord with professional concepts of general sanitation. Sewage nuisances are not to be tolerated, not alone because of specific disease potentialities, but because they are obnoxious to the general enjoyment of life. Water should be treated not alone to remove infectious microorganisms, but to make it socially and economically usable and acceptable in other respects. All insects which bite man in numbers are undesirable and should be done away with at public expense when they constitute a public nuisance.

Illustrative of this prevailing attitude, even in certain underdeveloped areas where malaria is a primary socioeconomic problem, was the great early popularity of DDT residual spraying—not primarily because the spraying controlled malaria or reduced enteric diseases, but because houseflies no longer bothered people. Conversely, the subsequent development of resistance by houseflies to DDT has hampered the execution of malaria control programs in some of these areas.

In recent years, thinking in professional public health circles has begun to come abreast of the lay attitude toward sanitation. Explicit in the Constitution of the World Health Organization is the statement:

"Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."

In harmony with this "positive health" concept and directly applicable to vector control is the following policy statement of the Acting Surgeon General of the Public Health Service in 1950 (*1*):

"It is our conviction that pest mosquitoes should receive more attention from health authorities than they have in the past. Public health has become something more than the absence of disease. Physical efficiency and comfort, on which mental equanimity depends to a substantial degree, may be seriously disturbed by the continued annoyance of pestiferous mosquitoes which may or may not have disease transmitting potentialities."

The Tennessee Valley Authority, long noted for its comprehensive and effective programs for control of the malaria vector, *Anopheles quadrimaculatus*, on its impoundages, has recognized the importance of controlling other species as well. In the spring of 1956, TVA's policy was amended to include control "of these other mosquitoes when their production in TVA waters constitutes a nuisance to sizable population groups or hazard to the public health."

Of current interest also is the frank recognition by the Public Health Service, its parent department, and the Congress that, in effect, not only is air pollution more than a communicable disease problem or even a respiratory illness problem, but a detriment to positive health and to general socioeconomic well-being. Accordingly, the Air Pollution Control Act (P. L. 159, 84th Cong.), which is administered by the Public Health Service under the supervision and direction of the Secretary of Health, Education, and Welfare, does not restrict the program of research and technical assistance to classic disease control aspects, but rather to this public problem as an entity.

As stated by Dr. Justin M. Andrews of the Public Health Service (*2*): "This is a very broad act which recognizes that air pollution may endanger health and welfare, injure agricultural crops and livestock, damage property, and create hazards to air and ground transportation. Thus, it is not limited to health in its implementing provisions." There is evidence of a similar breadth of approach to the air pollution problem on the part of affected State and local health departments, consistent with the sanitation tradition.

The air pollution problem in many respects is considered analogous to certain current vector problems in the United States. The severe

invasion of the city of St. Petersburg, Fla., and adjacent recreational areas by salt marsh mosquitoes in 1956, for example, may be compared with a severe smog episode in the city of Los Angeles. Smog episodes in Los Angeles are usually accompanied by numerous cases of eye irritation and discomfort. In St. Petersburg, there were reports of many cases of severe dermatitis requiring medical attention, especially among young children and infants.

In both cities specific disease transmission attributable to the respective environmental episodes was apparently absent. But the dislocation of community functions was pronounced, and there were clear-cut adverse effects on positive health, recreational activities, and mental equanimity. An aggravation of certain morbid conditions can be attributed in varying degrees to the episodes.

Vector problems in this country today may be broadly classified into three principal categories: (*a*) classic vectors which are responsible for the transmission of infectious disease at the present time, (*b*) species which possess public health and general socioeconomic importance as public nuisance problems, and (*c*) classic vectors which were responsible for the transmission of infectious disease in the past, but not at present. This classification is not clear cut since classic vectors in both categories may be public nuisance problems as well, depending on time and place. Conversely, nearly all the important species of mosquitoes which are commonly considered in this country as being primarily nuisance problems have either been incriminated in disease transmission at some time or place or have been proved experimentally to be capable of transmitting disease.

The chief vectors in the United States in the first category today are the housefly in areas where there is still a significant incidence of flyborne enteric infections, and those mosquito species which in various parts of the country are principal vectors of the encephalitides. Chief among these is the mosquito species *Culex tarsalis* widely distributed in the western irrigated States, especially in California. *Culex quinquefasciatus*, predominantly a nuisance species in most parts of the United States, is also a major vector of encephalitis in Texas.

The nuisance category comprises a large number of species which, individually or in small groups, present major problems in individual localities or larger areas. It is this group which today constitutes the basis for the enlarged definition of the term "vector." The group encompasses those insects and other animals which may adversely affect to an important degree the health objectives which are explicit or implicit in the WHO's and the Surgeon General's pronouncements. The importance of these problems has been adequately described and emphasized by the resolutions which were passed in 1955 and 1956 by the Association of State and Territorial Health Officers, the American Public Health Association, and several other more specialized bodies.

We prefer to see the justification for the control of such species presented on the clear-cut issue of their actual, well-established interference with man's interests. Irrespective of whether they do or do not constitute public health problems from everyone's point of view, we maintain that the control of these mosquitoes at public expense whenever they become primary public nuisances is warranted and indeed, often essential, to community existence. We further consider that local health and health-related agencies are the logical instrumentalities for carrying on such control measures. But to do so some of the agencies must manifest a greater interest in the needs and desires of the community pertaining to insect control as well as furnish the leadership and the guidance that the community needs and has a right to expect.

Uninterrupted technical service and research by State and Federal health agencies and other organizations is sorely needed to complement local action programs. We believe it to be more in the public interest to spend money for the control of such species than for the routine control of classic vectors which in the historic past have been responsible for disease in this country but no longer are, unless these historic vectors now constitute a significant nuisance problem. Apropos of this position, we quote another statement by Dr. Andrews, this time in reference to the mosquitoes of the far north (*3*).

"But whether these creatures spread disease

from lower animals to man, or from man to man, or whether they have nothing whatever to do with spreading disease, their overpowering numbers and vicious biting habits make insect control an almost necessary prelude to land development. To imply that they are unimportant from a health standpoint simply because they are not known to transmit infectious organisms is to discredit the basic tenet of the World Health Organization Charter. Thus, insect control becomes an essential function of health organizations in bringing about relief from severe insect pestiferousness."

However, for those whose interest in mosquitoes is limited to the classic approach, we call attention to the fact that knowledge of the etiology and public health significance of mosquito-borne viruses is in an embryonic and dynamic stage. Indicative of this is the recent isolation of 31 different unknown mosquito-borne viruses in a single year by a single laboratory in South America. These viruses were obtained from seven different genera of mosquitoes (*4*). We note further that many of the more important species of so-called nuisance mosquitoes in this country have been found naturally infected with one or more strains of encephalitis virus.

Practical Aspects of Vector Control

From the standpoint of a control program, the intimate interrelationship between vectors and nuisance species in this country today is often imperfectly understood. A prime example is provided by *Aedes nigromaculis* and *C. tarsalis* in California. *A. nigromaculis* is the principal nuisance species. *C. tarsalis* is the principal vector of encephalitis and a secondary nuisance problem. Neither species is controllable by DDT residual house spraying. Both species are mainly found in irrigated areas in California. About $3.4 million are locally appropriated each year in that State for mosquito control work performed by organized mosquito control districts or related organizational groups in local health departments.

Mosquito production through irrigation projects is a manmade problem. The basic method of control, therefore, is prevention and applies in large measure to both vector and nuisance species. Employment of recommended irrigation practices is in the joint interest of soil and water conservation, higher crop production, and avoidance of mosquito production. Permanent eliminative measures of recurrent control by larviciding tend to control vector and nuisance species, but in varying degree, depending on the amount of selectivity practiced. However, because of various factors, including differences in length of cycle from ovum to imago and preferences in microhabitat by the ovipositing female, it is possible to carry on species control measures which will suppress *C. tarsalis* considerably more effectively than *A. nigromaculis*. Such a program could be conducted at somewhat less expense than the present one.

If, as might be advocated by the public health purist, mosquito control forces were directed toward controlling only the classic vector insofar as possible, the following consequences could logically be expected: (*a*) abandonment or drastic curtailment of organized local mosquito activities since it is well established that public support for local mosquito control appropriations in California is mainly motivated by the desire for freedom from discomfort; and (*b*) a tendency to emphasize more highly selective palliative measures at the expense of species-comprehensive preventive measures.

One theoretical alternative would be the establishment of two mosquito control organizations in each local area: one to control classic vectors and one to control other mosquito species. Technical services and financial aid to local areas by the State, similarly, would be furnished by two separate State departments, each functioning in its own compartment.

The impracticality of either plan, we believe, is so obvious that the issue should not be labored further. But we wish to point out that the California program of controlling all mosquito species which constitute a public nuisance not only satisfies the public interest and results in economy in government, but also makes possible the provision of local organizations and funds which otherwise would not be available for controlling the classic vector. Accordingly, classic vector control objectives are directly served by nuisance mosquito control. Conversely, in other situations nuisance control

interests have been and continue to be served by programs for the control of classic vectors.

Curiously, workers in certain quarters either have accepted or are believed to be readily capable of accepting the logic that local health departments should carry on comprehensive mosquito control but that supportive services by State and Federal health departments should be totally or almost entirely restricted to "classic vectors." This is in contrast, for example, with the position of the Florida Legislature which considers that all of the more important nuisance arthropods are of public health concern. This legislature has directly charged the Florida State Board of Health with the administration of a large State subvention appropriation for comprehensive control by local agencies and with a concomitant program of direct research and technical supervision.

Since California has been selected as offering an example of the integral relationship between classic vectors and nuisance species from a control standpoint, State agency supportive service in that State might well be reviewed. Such supportive service includes a modest State subvention appropriation to local mosquito control agencies for the principal purpose of augmenting control of the classic vector. However, because of the interrelationship between the production of the various mosquito species, it is not possible to spend these subvention funds in a manner which insures their exclusive application to *C. tarsalis*. Of more significance from a policy standpoint is the fact that most of the local mosquito control agencies in California look to the State department of public health chiefly for technical information and other service on new or improved methods of controlling problem mosquitoes, irrespective of their particular vectorial status.

Toward the discharge of this function, the health department, through its bureau of vector control, carries on certain investigations of control operations and research activities. The control of *A. nigromaculis* is more difficult than that of *C. tarsalis*, and it is also a problem of even greater magnitude. Hence, it is the position of local agencies and the bureau that enhancement of the adequacy of control of *C. tarsalis* by local operating agencies can be brought about as expeditiously, and often more readily, by the development of new and improved methods of controlling *A. nigromaculis*, as by similar progress toward the direct control of *C. tarsalis*. Yet such activities by State and Federal agencies are not uncommonly considered inappropriate, at least by the very effective action of opposing appropriations for their prosecution.

As traditionalists in public health administration, the committee members consider that the first responsibility of State and Federal health agencies is to support local health agencies by research in needed fields and in such other manner as may be appropriate. They consider that the scope of such support should be established by the actual programs and needs of local health agencies since these yardsticks provide a more reliable measure of public needs and interests than any other.

Last, we wish to offer the afore-described enigma as further evidence of the error of arbitrarily compartmentalizing the components of any sanitation system into so-called public health and nonpublic health categories or into major and irrelevant categories. We consider it infeasible, for example, in the United States today under prevailing health and socioeconomic conditions to draw a sharp distinction in the sanitation of food-handling establishments between infectious dirt and noninfectious dirt, the proper objective rather being a clean establishment and "sanitation as a way of life." The same principle extends into all fields of sanitation, including air pollution, water quality control, housing, and last, but not least, vector control.

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Sanitation Survey in Vicksburg

VARDAMAN T. HAWKINS, B.A.

WITHIN the city limits of Vicksburg, Miss., in the tenement sections, on the main streets, and even in some of the fine residential districts, hundreds of tenants have been using community toilets or chilly privies located in central areas in the yards. The sanitarians of the Warren County Health Department have found and are still finding from 1 to 9 families using one toilet. In many areas where sewer lines have been available for from 1 month to 49 years, pit privies constructed during WPA days have been in use.

After checking on daily complaints of such conditions for several years, the health department sanitarians had reason to believe that their city with a population of 37,000 was in great need of a sanitation survey.

In January 1955 we met with the mayor and board of aldermen and outlined the existing conditions and the remedies we believed necessary for wholesale correction. We discussed the need for a new sanitation ordinance that would cover in specific detail most of the existing insanitary conditions or circumstances. After the presentation, the mayor and board asked us to write a new ordinance and present it to the city attorney for his approval.

The ordinance was approved July 7, 1955, and the health officer and sanitarians conferred on enforcement methods.

Survey Methods

From the engineering department, we obtained sectional maps showing all city sewer lines and had them enlarged about four times to allow sufficient space for identifying each residence or place of business and indicating the status of the sanitary facilities. The map sections are numbered 1 through 16, with each number corresponding to the area covered on the city sewer map. For accessibility they are mounted on shade rollers and kept in a map case.

Spot checking the property and plotting it on the maps were sure to take time, but we considered thoroughness essential. As property is surveyed by automobile and jeep as well as on foot, it is earmarked on the map with a stamp divided into three sectors and a rectangular block. The first sector represents either city sewerage connections, septic tank, or pit privy; the second, city water; and the third, properly screened doors and windows. The property number is entered in the block and the house number underneath. A property card, bearing a corresponding number, is prepared for coding as to type of facility and filed by streets (see chart).

We then inspect the property to determine if correction is needed. Until completion of the inspection the insignia on the map is white. If inspection shows that the facilities are connected to the city sewerage and water systems and are properly screened, the three sectors are shaded green. If no sewerage line is available and a properly installed septic tank is in use, the first sector is shaded orange and the other two sectors green. Where no sewage facilities or septic tank can be installed and a pit privy meeting health standards is available, the first sector is shaded red and the other two green.

Mr. Hawkins, sanitation supervisor of the Warren County Health Department, Vicksburg, Miss., presented this paper at the annual meeting of the sanitarians of the Mississippi State Board of Health in Jackson, Miss., in December 1956.

Purple in the rectangular block carrying the property number indicates that the health department has ordered corrections.

With these different colors or shades we are able to picture the sanitary facilities and at the same time the health department's activity and progress.

Following inspection, a form letter is used to advise owners of conditions, corrections needed, and the time granted for compliance. The length of the compliance period is governed by several factors: size of job, number of installations to be made, and the circumstances under which work must be performed. Under ordinary conditions, 30 days is granted for corrective measures. On property held by heirs, the time may run from 30 days to 6 months.

Our first plan of action was to clear each area successively of all violations. We decided after several weeks, however, that corrective action would be speeded if we covered many areas in the city at once. This procedure helped spread the news of work that must be done, and the results were beyond our expectations. In many places we found new facilities installed in anticipation of the inspection.

The number of notices sent out at a given time depends on such circumstances as weather, plumber workload, and number of installations by any individual owner. Many owners have contracted for installations which cannot be completed within the time granted. In such circumstances we note on a copy of the form letters that work is in progress and a new date for completion is set. The notices are checked from day to day and premises are reinspected when necessary to determine compliance. When no action has been taken toward installation, the occupants, owner, or agents are asked to explain the delay. If the explanations are reasonable, more time is granted.

We have found that the people are understanding and fundamentally cooperative. Generally, we have needed only to stimulate civic pride and thereby obtain corrective results. However, if no effort has been made to remedy facilities, we grant only a minimum of additional time for starting the job, usually from 5 to 10 days. When no work is done by the expiration of this new time, court action is taken. We have had to resort to the courts in only 31 cases, representing about 4 percent of the 771 sewer connections installed as of June 20, 1957. None of these court cases have been lost or appealed.

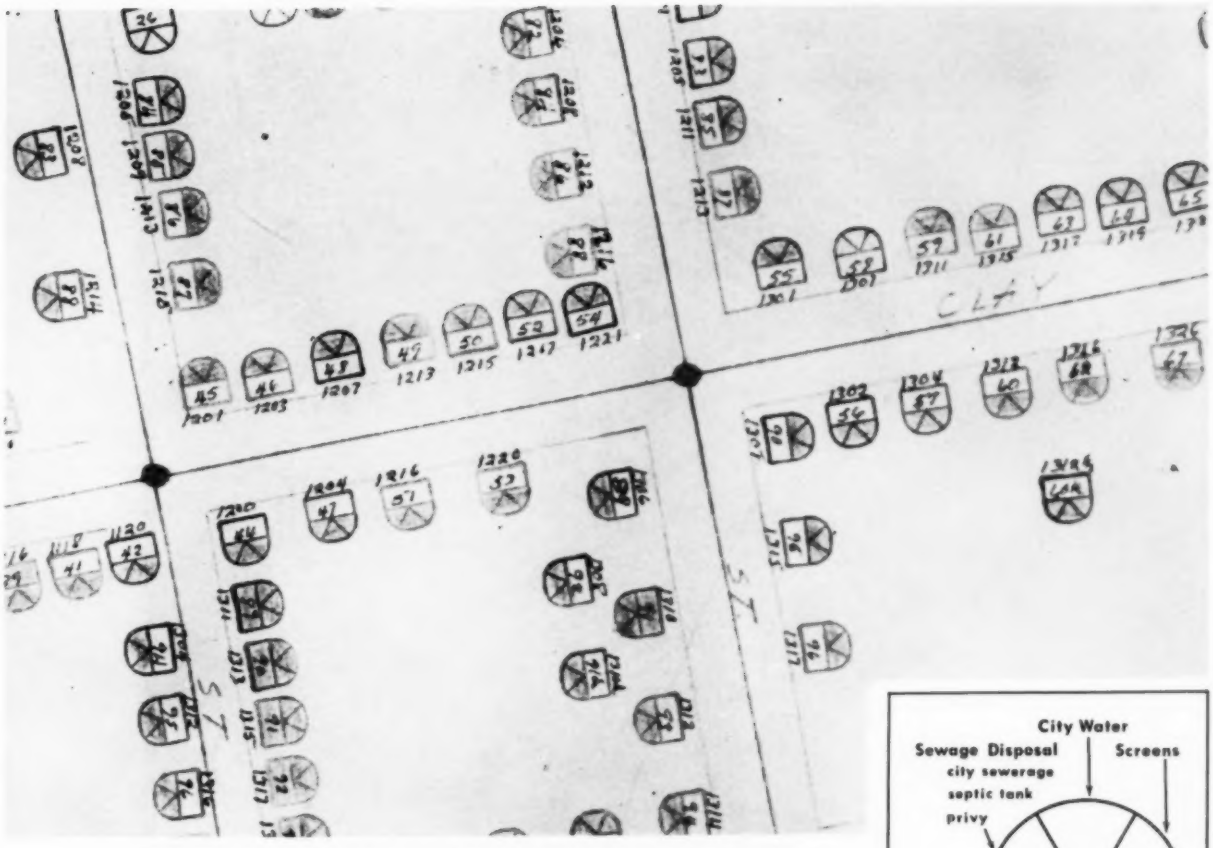
The sanitation survey revealed that no sewer lines were available in many heavily populated areas in the city. We asked the residents on these streets and in these areas to draw up petitions requesting the mayor and board of aldermen to extend lines to their property. The health department has followed such petitions with facts, figures, and recommendations that they be granted. We are justly proud of the response that our city fathers have given this phase of the survey. Sewer connections have been installed on 30 additional streets and areas, comprising 426 homes that may now employ indoor sanitary flush toilets rather than the pit toilets previously used. Unfortunately, in some areas in the city, sewer lines cannot be laid because the topography prevents gravity flow. We expect that this survey will bring about the installation of several lift stations to accommodate several of these areas.

If we had to suggest a first step in slum clearance in any city we should recommend a sanitation survey. In the city of Vicksburg we have encouraged as many as 32 bathroom installations in one neighborhood. Before this survey these 32 families were using 8 outside obsolete frostproof toilets located in a central yard. At the same time, these 32 homes have been given gas connections, kitchen sinks, and structural repairs. In fact, repairs, installations, and cleanups have completely changed the appearance of some neighborhoods.

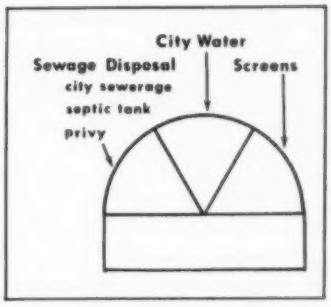
The effect of the improvements has been to increase the value of property, to improve living conditions, and, above all, to replace a hazardous environment with a relatively clean one.

Effective Ordinance

The success of this sanitation survey can be attributed first to the desire of people to move forward; second, to a just and unbiased court; and third, to a good sanitation ordinance. People must have leadership to move forward under any circumstances. We as



Part of sectional map used in Vicksburg sanitation survey.



Inset. Inspection data stamp.

sanitarians have tried to supply that leadership by gaining and holding the confidence of the residents we serve. This confidence has been well demonstrated by the fact that 96 percent have complied with our instructions. Many conferences were held with the noncompliers before court action was brought. In these conferences we pointed out the many problems encountered by other property owners in like circumstances.

In all activities in the survey, we have tried to be fair and impartial. This has been our greatest asset in the courts. Even when we have been compelled to resort to court action, much good has been derived apart from the judge's decision. There is more respect for the health department than ever before. This we consider a long-term gain.

A third asset has been the sanitation ordinance, which we believe is equal to any situation that may arise in a sanitation survey. Three sections in particular have been helpful. Section 4 requires that each residence or place of business within the city of Vicksburg shall be provided with a sanitary flush toilet and that this toilet must be located in the dwelling or in a room attached to the dwelling. In other words, no more outside community or yard toilets are allowed. The city has many outside facilities, but as major repairs are needed these toilets will be condemned and owners will be notified to make installations inside. This will gradually eliminate all outside systems where the sanitary sewer lines are available.

In areas where sewers are not available, section 5 requires that owners install a septic tank and field line if the lot size will permit an installation that meets the minimum requirements of the Federal Housing Administration. Provisions have been worked out between the

city and the health department whereby the health department supervises all septic tank installations within the city. Permits are not granted or issued to proposed builders until the health department is consulted. Where sewer lines are not present and lots are not suitable or adequate for septic tank construction, section 6 allows a properly constructed pit privy meeting Mississippi State Board of Health standards. In instances in which the outdoor privy is the only practicable facility, we encourage its maintenance in a condition that will not be hazardous to health.

Since the beginning of the survey, Vicksburg has voted bonds in the amount of $800,000 for the extension of 38 miles of new sewer lines. We feel that this is another direct result of the sanitation survey. This new system of sewers should be ready for use by October 1957. The inspections have already been made in this new area. When the sewer is completed, 653 known septic tanks and 61 pit privies will be eliminated. Many lots and building sites will be made available for buildings which would never have been suitable without the sewer extension since these lots are too small for septic tank installation.

Accomplishments

To summarize briefly the accomplishments of the Vicksburg sanitation survey, 7,165 homes and establishments have been surveyed or inspected; 771 sewer and 881 water connections have been made; 255 septic tanks and 21 new pit toilets have been installed. Repairs to 102 flush toilets and 35 pit toilets have restored them to approved standards. The door or window screens, or both, that have been added to 605 homes and establishments prevent the entrance of insects. And new sewer lines have been installed on 30 additional streets or areas, providing sewer connections for 426 additional homes.

1957–58 Training Grants

Grants and awards totaling almost $2 million for the training of public health specialists in the 1957–58 academic year have been announced by the Public Health Service.

Slightly more than half of the funds were awarded to 230 persons, including physicians, engineers, health educators, laboratory workers, dentists, and others who will enter colleges and universities this fall for a year of graduate public health training.

The balance went to 44 colleges and universities offering programs of study in public health nursing and to 11 schools of public health. These 55 schools will select trainees to benefit to the extent of 252 man-years of instruction: approximately 250–300 nurses and 70 other professional health personnel are expected to receive awards from the grantee institutions.

This is the second year that public health training funds have been available from the Federal Government. In 1956–57, with a $1 million appropriation, the traineeship program provided training for 363 public health workers. More than 600 individuals are likely to be assisted this year.

In selecting trainees, consideration is given to the personnel shortage in the candidate's field, the age of the candidate, his training and experience, and other factors which will increase the supply of young, well-trained workers.

Progress in Reporting Mental Hospital Statistics

Seventh Annual Conference of Mental Hospital Statisticians, Washington, D.C., May 8–10, 1957

THE NEED for more specific annual and monthly data on the movement of the patient population of mental hospitals, interstate comparisons of cohort studies, and reevaluation of basic definitions of terms applying to patient movement were major topics at the Seventh Annual Conference of Mental Hospital Statisticians. The conference, held at Washington, D. C., May 8–10, 1957, was sponsored by the National Institute of Mental Health, National Institutes of Health, Public Health Service. Delegates from 17 of the 18 member States of the Model Reporting Area for Mental Hospital Statistics attended (see box inset).

In addition, unofficial observers from Connecticut, Delaware, District of Columbia, Kentucky, Massachusetts, North Dakota, Tennessee, and the Veterans Administration were present. Other guests represented the Joint Commission on Mental Illness and Health, the American Psychiatric Association, the Bureau of Prisons, Department of Justice, and the Dominion of Canada and two of its Provinces.

In reviewing the work of the Model Reporting Area since its inception in 1951, Dr. Morton Kramer, chief, Biometrics Branch, National Institute of Mental Health, mentioned as major accomplishments the progress made toward standardization of definitions and the development of the cohort approach to the study of the population dynamics of mental hospitals. The quality and scope of the studies carried out during the past year would not have been possible without the close cooperation which exists among members of the Model Reporting Area. (For a short account of the establishment and objectives, see *Public Health Reports*, October 1956, p. 1033.)

Cohort Studies

A cohort study committee was appointed by the sixth conference to review data submitted in a uniform manner by member States and to make recommendations regarding further refinements of these studies and plans for publication. The findings of this committee, based on data submitted by 11 States during the year, were reported at the meeting.

These data showed proportions of patients released from, dying in, or retained in, public mental hospitals in each of the States within the first 12 months following admission. Considerable variation among States was found for each category. The committee listed a number of factors which might account for these differences, such as screening facilities in the community, legal requirements, administrative policy, type of patient admitted, and severity of illness.

In an attempt to achieve greater comparability among the States, the committee recommended that, in the future, groups of patients should be tabulated and studied separately ac-

This report was prepared by the Hospital Studies Section, Biometrics Branch, National Institute of Mental Health, Public Health Service, Bethesda, Md.

cording to type of commitment and location of patient immediately prior to admission. It was also proposed that, since patients may be released for nonmedical reasons, such releases be tabulated according to whether the patients were released to the community or to another hospital outside the State system and whether released with or against medical advice.

The committee recommended that these cohort data be published. It proposed that such publication be primarily oriented toward pointing up problems in interstate comparisons and should include the following:

1. A general introductory statement of the problems in interstate comparisons of these cohort data.

2. A presentation of the data for those States which have conducted cohort studies.

3. A more detailed discussion of problems of comparison based on descriptive statements from each of the States. Each statement would cover four points: (*a*) laws and policies regulating admission and release of certain groups of patients, (*b*) facilities in the community for diagnosis and treatment of mental disorder, (*c*) intrahospital factors affecting admission and release, and (*d*) other factors affecting release, such as characteristics of the population of the community and the existence of other facilities in the community.

Noting the wide variation among States in release, death, and retention rates, the committee felt that the States should be protected against invalid interpretations. Therefore, considerable discussion was given to the problem of whether the States should be identified by name in a publication of this type. There is a real danger that these data, so identified, could be interpreted in various ways by various individuals depending upon the uses to be made of them. However, it is the responsibility of each of the States which submitted cohort data to furnish for publication the best possible explanation of the limitations of its data. There was a feeling expressed by some of the group that real understanding of differences between States in the probabilities of release, death, and retention cannot be obtained unless the States are properly identified.

Seven of the member States are conducting cohort studies of patients first admitted to their mental hospital systems on a continuing basis. Studies have also been begun in some States in which cohorts of patients who have been resident in the hospital for specified lengths of time are followed for a period subsequent to a given date. Some States are also beginning cohort studies of released patients to determine probabilities of return to the hospital for specified lengths of time after release. These studies will provide more precise data than those provided by the use of discharge rates in which the number of discharges during a year was related to the number of patients under treatment or to some other measure of the number of patients exposed to the risk of discharge.

Basic Definitions

One of the original aims of the Model Reporting Area was to develop a set of definitions of mental hospital population movement terms which could be uniformly applied in national reporting. It was believed that this would constitute a great step forward in achieving interstate comparability of mental hospital data. Such definitions were developed and adopted at earlier meetings of this group.

Since these definitions were developed to remove the effect of interstate variations in practices and policies, they are, of necessity, compromise definitions. At the 1957 meeting, therefore, the experiences of the States in the use of these definitions were reviewed in order to determine whether the definitions are achieving the goal for which they were established.

In group discussions the conference reviewed

Model Reporting Area States

Representatives from the following States are members of the Model Reporting Area for Mental Hospital Statistics.

Arkansas	Michigan	Oklahoma
California	Minnesota	Pennsylvania
Illinois	Nebraska	Texas
Indiana	New Jersey	Virginia
Kansas	New York	Washington
Louisiana	Ohio	Wisconsin

the definitions of resident patient, first admission, transfer, and certain special categories of care, such as family care, day care, and night care. The following points represent the consensus of the conference:

1. The definitions in their present form are not entirely satisfactory because they are difficult to apply in some cases; there are minor inconsistencies; and they are not available in one publication for ready reference.

2. A standing committee on definitions should be established to reexamine existing definitions and recommend new ones.

3. Until recommendations of this committee have been adopted the present definitions should be adhered to for national reporting.

A committee on definitions was appointed. It will meet during the year and will submit a report to the next annual conference. One of the most valuable services of this committee will be to specify the purposes for which data, based on each definition, may be used and to indicate the specific limitations of such data.

Patient Movement Data

The number of resident patients at the end of fiscal year 1956 showed a decrease from the number at the beginning of the year. Since this was the second time in history that such a decrease occurred, many theories were advanced as to its cause. Foremost was the advent of the widespread use of the tranquilizing drugs. The existence of such theories, without supporting data, emphasizes the need for more detailed data on the movement of mental hospital populations. If data on number of admissions, releases, deaths, and resident patients at end of the year were available according to such factors as age, sex, mental disorder, and length of hospital stay, one should be able to determine more specifically the areas in which changes in the resident population are taking place.

The statistical reporting systems in several States will accommodate readily preparation of data of this type. The conference agreed that forms should be developed to obtain information on this detail and that the data should be distributed to the members of the Model Reporting Area on a trial basis.

Reporting of mental hospital population movement data on a monthly basis by Model Reporting Area States began in December 1956. The purpose of such reporting is twofold: to obtain data for administrative purposes on a highly current basis and to permit the isolation and removal of seasonality in studying trends in the movement of mental hospital populations. Tables based upon reports for the first 3 months had been distributed to the members of the area in advance of the meeting. There seemed to be considerable consistency among States in the direction of change of population movement from one month to the next. For example, of the 16 States reporting, all but 2 showed a decrease in number of resident patients during December 1956 while in all but 4, mental hospital populations increased during January and February 1957.

Sufficient data had not yet been collected to provide estimates of the seasonal factor. Therefore, plans were discussed for analysis and presentation of these monthly data once the second year of this collection has begun.

Mental Hospital Statistics in Canada

Four representatives from Canada attended this meeting, two from the Dominion Government and two from Provincial governments. Apparent from the description of the mental hospital statistics program which these delegates presented were the striking similarities in the problems facing the mental hospital statisticians in the two countries. Each has problems in obtaining prompt reports and using uniform definitions.

Each of the 10 Provinces of Canada reports to the national statistics office, but maintains its own mental hospital statistics system. This is essentially the same procedure which is carried out by the Model Reporting Area.

However, one fundamental difference in national reporting exists. In Canada individual patient data are submitted to the Dominion Government by each of the Provinces. In the United States, on the other hand, this is done only on a special study basis. As a routine, only certain specified tabulations are submitted to the National Institute of Mental Health.

This and future interchanges of ideas between the mental hospital statistics personnel of Canada and those of the United States will be of great mutual benefit to the two countries.

Other Problems

Plans are being formulated for collecting a certain amount of socioeconomic data on each patient admitted to mental hospitals during the period centered around 1960. Classifications closely paralleling those used by the Bureau of the Census will be adopted so that mental hospital data can be related to comparable data for the general population which will be obtained in the 1960 United States Census of Population. A similar collection of data for admissions to outpatient psychiatric clinics is being planned.

The need for more precise, sensitive, and useful statistical indexes of institutional operation was stressed. It was suggested that statistical quality control techniques might be applied to mental hospital data in such a way that the administrator would be provided with up-to-the-minute indications for courses of action based on the current and past operation of his program. A committee was appointed to study this problem.

The concern expressed at the Sixth Conference of Mental Hospital Statisticians regarding the nomenclature for mental defectives was reemphasized. In view of the fact that several States had already developed their own statistical classifications of mental defectives, thus creating greater noncomparability, a resolution was passed urging the American Association on Mental Deficiency to take immediate action to develop a new nomenclature. It was further resolved that a date for such revision be publicized so that the introduction of other individual nomenclatures would be discouraged.

Regional Meetings

A report was given covering the proceedings of the Second Midwest Conference on Mental Health Statistics, held at Madison, Wis., on October 25–26, 1956. These meetings are a direct outgrowth of the annual conferences of mental hospital statisticians and are designed to focus on problems of interstate comparability of mental hospital data in the midwest.

A reporting system aimed at greater mutual understanding of the State mental hospital systems has been developed by this group. The emphasis of these reports is on the types of inpatient facilities for mental illness, the types of care provided by these facilities, and the types of admissions to these facilities. A similar meeting is being planned for October 1957.

Assistant Surgeon General for Personnel and Training

Otis L. Anderson, M.D., has been assigned to the newly created post of Assistant Surgeon General for Personnel and Training, Public Health Service. His previous duties as chief of the Service's Bureau of State Services will be assumed by **David E. Price, M.D.,** deputy chief of the Bureau of Medical Services since March 1957. The changes become effective October 1, 1957.

In his new position, Dr. Anderson will represent the Surgeon General in all matters relating to personnel and training. He will be responsible for the development, utilization, assignment, recruiting, and training of personnel.

Dr. Anderson has spent his entire professional career in the Service, following his graduation in 1929 from the College of Medicine, University of Nebraska. His duties have included medical practice and hospital administration.

Dr. Price, who also has spent all of his professional career in the Service, is a graduate of the University of California School of Medicine and of the Johns Hopkins School of Public Health. His early activities were in venereal disease control. In 1946, he was assigned to the newly established Research Grants Division, and in 1950 he was named associate director of the National Institutes of Health. Two years later he became Assistant Surgeon General in the Office of the Surgeon General.

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